Evaluating interprofessional collaboration, normalisation and implementation fidelity of an on-site pharmacist intervention within Australian residential aged care facilities

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Abstract

Background

The Australian population is ageing with residents living in residential aged care facilities (RACFs) continuing to be at higher risk of, and more likely to experience medication-related harm. Reducing medication-related harm in older people is an important health priority internationally and in Australia. RACF medication management is complex and current efforts to improve medication management are inadequate. There have been recently accelerated efforts to improve RACF medication management with one suggested approach relating to integrated pharmacists working within Australian RACFs i.e. an on-site pharmacist (OSP) intervention. This research was undertaken to evaluate interprofessional collaboration, normalisation and implementation fidelity of an OSP intervention within Australian RACFs. Evaluation of these key components of the OSP intervention have supported an expanded knowledge and understanding of the OSP role as well as the perceived (or potential) benefits of OSPs working within RACFs to help improve medication management.

Methods

This research was nested within the *Pharmacists in Residential Aged Care Facilities* (PiRACF) study wherein a part-time OSP was directly employed by a RACF to improve medication management. The PiRACF study was conducted as a cluster randomised controlled trial which commenced in 2020. The first study of this thesis was a scoping review which explored the evaluation approaches, tools and aspects of implementation employed in the current Australian and international evaluated peer-reviewed pharmacist RACF intervention literature. This scoping review identified potential gaps in the current literature which informed this thesis's subsequent research questions and overall aim.

The second study was a mixed methods study which was underpinned by an existing collaboration model (McDonough and Doucette's conceptual model for the development of pharmacist-physician collaborative working relationship). It explored the extent and nature of interprofessional collaborative relationships between OSPs and prescribers, managers and nursing staff (health care team members).

The third study was a mixed method study which was underpinned by an existing theory (Normalisation process theory). It evaluated the extent to which OSPs became part of routine practice (i.e. normalised) from the perspective of health care team members, OSPs, residents and family members. The final mixed methods study was underpinned by an existing framework (Hasson's conceptual framework for implementation fidelity). It also assessed the implementation fidelity of OSP intervention delivery and identified moderating factors which influenced delivery of the intervention.

Results

The scoping review identified three potential research gaps, namely, limited evaluation of interprofessional collaboration, sparse use of theory to guide evaluation and limited consideration of implementation fidelity in the current evaluated peer-reviewed pharmacist intervention in RACF literature. The OSP role is relatively new in Australia and this thesis contains the first studies that have evaluated interprofessional collaboration, normalisation and implementation fidelity of an OSP intervention within Australian RACFs. The second study concluded that OSPs were able to establish and maintain positive interprofessional collaborative relationships with health care team members based on the findings of semi-structured interviews (n=33) and an adapted survey which was distributed at two time points (T1: n=33; T2: n=19). These promising findings suggested that further exploration of the OSP intervention was warranted.

The third study indicated that OSPs were generally considered to be part of routine practice within their respective RACFs based on the findings of semi-structured interviews (n=47) and an adapted survey (n=16). The findings of this study could help inform the future role of OSPs working within RACFs, particularly in relation to supporting residents and their family members to have increased medication knowledge and thereby feel more confident and empowered when discussing medication management decisions with health care team members e.g. prescribers.

The fourth study evaluated the overall fidelity of each intervention RACF as being of medium fidelity. That is, the OSP intervention was generally delivered as intended based on three quantitative data sets relating to the range of OSP intervention activities delivered, a random sample of medication reviews assessed for quality, and the proportion of residents who received

at least one medication review as part of the OSP intervention. A range of moderating factors contributed to the overall medium fidelity across the intervention RACFs with a number of potential barriers and facilitators to optimal delivery of the OSP intervention identified from the semi-structured interviews (n=14). The identified potential barriers and facilitators may help or hinder OSPs working in real-world RACFs, and would likely impact the extent to which the OSP intervention is delivered as intended.

Conclusion

Medication-related harm experienced by residents living in Australian RACFs remains a problem. To date, efforts to improve medication management within RACFs have been inadequate. Integrated pharmacists working within RACFs i.e. an OSP intervention, is a recent approach which has been suggested which may help improve RACF medication management. This research found that OSPs can positively contribute to interprofessional collaborative care within RACFs, that OSPs can become part of routine RACF practice and that the OSP intervention can generally be delivered as intended in real-world RACFs. The findings of this research constitute an original contribution to knowledge and are timely. Based upon these promising findings, recommendations for further OSP research have been made. Moreover, this research has identified some important policy and practice implications for the roll out of OSPs within Australian RACFs commencing from 2023.

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Publications and presentations

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Batten M, Lewis J, Kosari S, Naunton M, Strickland K. Exploration of an on-site pharmacist intervention within Australian residential aged care facilities using normalisation process theory: A mixed methods study. Health and Social Care in the Community (under review) (Chapter 5)

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List of abbreviations

ACCHO	Aboriginal Community Controlled Health Organisation
ACT	Australian Capital Territory
AHPRA	Australian Health Practitioner Regulation Agency
AITCS	assessment of interprofessional team collaboration scale
AMA	Australian Medical Association
CHIPPS	Care Home Independent Prescribing Pharmacist Study
CI	confidence interval
COREQ	consolidated criteria for reporting qualitative research
COVID-19	Coronavirus Disease 2019
cRCT	cluster randomised controlled trial
CWR	collaborative working relationship
EN	enrolled nurse
GP	general practitioner
GPP	general practice pharmacist
HREC	Human Research Ethics Committee
ICC	intraclass correlation coefficient
MMAT	mixed methods appraisal tool
NoMAD	normalisation measure development
NP	nurse practitioner
NPT	Normalisation process theory
NSW	New South Wales
ORCA	organisational readiness to change assessment
OSP	on-site pharmacist
PEACE	Palliative Aged Care Specialist

PEPA	Program of Experience in the Palliative Approach
PHN	Primary Health Network
PiRACF	Pharmacists in residential aged care facilities
PPCI	physician-pharmacist collaboration index
PSA	Pharmaceutical Society of Australia
QD	qualitative descriptive
QUAL	qualitative
QUAN	quantitative
QUM	Quality Use of Medicines
RACF	residential aged care facility
RE-AIM	Reach, Effectiveness, Adoption, Implementation, Maintenance
RMMR	Residential Medication Management Review
RN	registered nurse
SD	standard deviation
SHPA	The Society of Hospital Pharmacists of Australia
T1	time point 1 (from 3 months after OSP commencement)
T2	time point 2 (from 9 months after OSP commencement)
UK	United Kingdom
US	United States
WHO	World Health Organization

Chapter 1 Introduction

This chapter outlines the setting in which this research was undertaken. It provides the context and justification for the research described in this thesis through providing background on residents living in residential aged care facilities, medication management within RACFs, and the extent of medication-related harm within RACFs. The current approaches and more recent efforts to improve medication management are also outlined. This chapter concludes with a description of the *Pharmacists in Residential Aged Care Facilities* study, within which this thesis was nested, a description of this research's aim and questions, and an outline of this thesis.

1.1 Residents living in residential aged care facilities (RACFs)

As of 30 June 2020, approximately 16% of Australia's total population was aged 65 years or older (defined as older people), and by 2066 this number is projected to be 21% (Australian Institute of Health and Welfare, 2021). The life expectancy of Australians is also on the rise (Australian Bureau of Statistics, 2022). While most older Australians tend to receive aged care support through programs based in their own homes (Australian Department of Health and Aged Care, 2022a), it is anticipated that as this population increases, there will be a proportional increase in the number of older people requiring care that cannot be delivered in their homes.

For the purposes of this thesis, the term residential aged care facilities (RACFs) is used to encompass nursing homes, care homes, long-term care facilities and residential aged care settings in which older people may live (Batten et al., 2022). In Australia, RACFs are designed to support and accommodate residents who may require care that can no longer be provided in their own home (Australian Institute of Health and Welfare, 2022).

In 2021–22, around $24.8 billion was spent by the Australian Government on aged care, with the largest proportion of spending (59%) allocated to RACFs (Australian Department of Health and Aged Care, 2022a). During the same financial year there were 805 approved RACF providers, and as of 30 June 2022, there were almost 180,750 permanent residents living in RACFs (Australian Department of Health and Aged Care, 2022a).

Most residents living in RACFs have complex and high-care health needs (Australian Institute of Health and Welfare, 2022). Residents living in RACFs are more frail, and are more likely to experience cognitive impairment compared to older people who are able to remain living in their own homes (Chen et al., 2019; Kosari et al., 2018; Sluggett et al., 2017; Testa et al., 2020). Furthermore, as a person ages they are more likely to experience factors such as physiological impacts of ageing i.e. changes to how medications are metabolised and cleared from the body (Milton et al., 2008); with impacts on the appropriateness of prescribed medications. RACF residents may also have increasing reliance on more medications to manage their multiple chronic health conditions (Sluggett et al., 2017).

It is anticipated that older Australians will continue to require higher levels of care which will place further demands on the Australian health care system, including RACFs, in the coming years. This will likely further exacerbate existing medication management challenges within RACFs.

1.2 Medication management within RACFs

As illustrated in Figure 1, the term medication management encompasses the steps associated with provision of medication. These steps include how a medication is prescribed, supplied, dispensed, recorded, administered and how its use is monitored (Australian Department of Health and Aged Care, 2022c; Stowasser et al., 2004). Medication management within RACFs is generally understood to be complex (Australian Department of Health and Aged Care, 2022c; Tariq et al., 2012), in part, due to multiple medication management steps requiring involvement from multiple stakeholders, at both the individual and RACF level (Australian Department of Health and Aged Care, 2022c; Sadeq et al., 2022). The resident living in the RACF should always be the central focus of the medication management process and wherever possible they should be involved when the decision to prescribe is made (Australian Department of Health and Aged Care, 2022c).

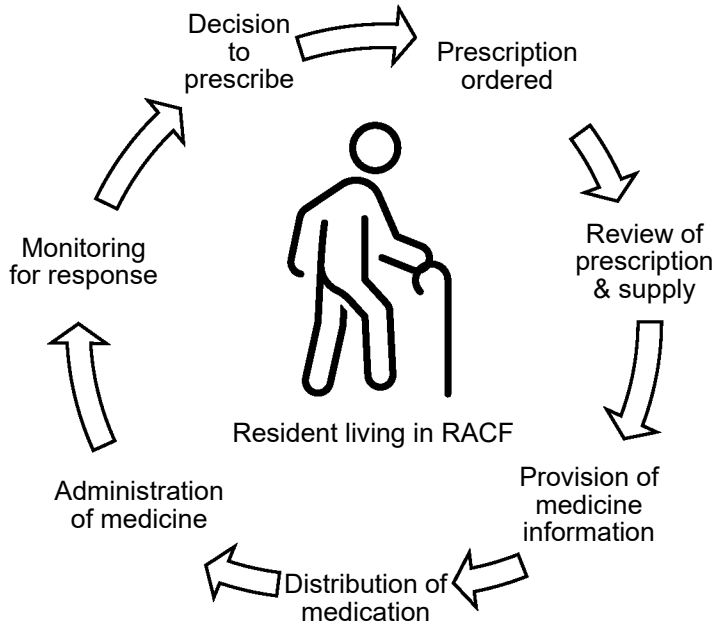


Figure 1: Medication management pathway process (adapted from Stowasser et al., 2004 and *Guiding Principles for Medication Management in Residential Aged Care Facilities*, Australian Department of Health and Aged Care, 2022d)

Interactions and communication between residents, family members, on-site RACF staff (managers, registered nurses, care staff) and visiting staff (general practitioners (GPs), specialists, nurse practitioners, pharmacists) in relation to medication management can be challenging due to factors such as the ongoing high rates of RACF staff turnover (Cross et al., 2022) and the limited capacity for residents to access GPs (Cross et al., 2022; Hillen et al., 2016). Limited medication knowledge and high workloads amongst RACF staff (Al-Jumaili et al., 2017) also play a contributing role. These challenges were further intensified during the COVID-19 pandemic wherein there was an increase in workload for health professionals, including those in RACFs (Brydon et al., 2022). Government restrictions that limited RACF visitor interactions with residents in 2020 – 2021 (Australian Department of Health and Aged Care, 2020) likely also curtailed opportunities for residents and family members to discuss medication management matters with on-site RACF staff and visiting staff.

Poor medication management remains one of the most common complaints raised by residents living in RACFs (Aged Care Quality and Safety Commission, 2022). Part of the remit of the Royal Commission into Aged Care Safety and Quality (Royal Commission), established in 2018, was to inquire and provide recommendations in relation to aged care service medication

management. According to its interim report, 33% of submissions that the Royal Commission received related to medication management concerns (Royal Commission into Aged Care Quality and Safety, 2019). To date, there remains the real possibility that the complexity of the RACF medication management process is contributing to the medication-related harm experienced by residents living in RACFs.

1.3 Medication-related harm within RACFs

Medication-related harm is the overarching term used to describe harm amongst patients caused by medication errors and unsafe medication practices ranging from prescribing of potentially inappropriate medication through to dispensing and administration errors (World Health Organization, 2017). Medication-related harm is an important health priority internationally. This was evidenced by the World Health Organization's third Global Patient Safety Challenge: *Medication without harm* with one of its key priority areas relating to polypharmacy (use of several medications), which older people are more likely to experience (World Health Organization, 2017).

Moreover, in Australia, Quality Use of Medicines and Medicines Safety was identified as the nation's 10th National Health Priority in 2019 (Australian Department of Health and Aged Care, 2019). Medication management continues to be a problem within Australian RACFs; more than 95% of RACF residents are reported as having at least one medication-related problem (Pharmaceutical Society of Australia, 2019), which can easily lead to medication-related harm. Residents living in RACFs are also more likely to take additional medications and are thus more likely to be at higher risk of, and more likely to experience medication-related problems (Sadeq et al., 2022). These problems may relate to over- or under- use of a medication (through inappropriate prescribing, dispensing or administration), inappropriate medication use or be a consequence of an adverse drug reaction or medication interactions (Australian Department of Health and Aged Care, 2022c).

Furthermore, it has been estimated that up to 80% of residents living in Australian RACFs are prescribed potentially inappropriate medications (Bony et al., 2020; Harrison et al., 2018; Pharmaceutical Society of Australia, 2019). Potentially inappropriate medications may contribute to medication-related problems experienced amongst older patients (Alhawassi et al., 2019). The current picture of medication-related harm experienced by residents is bleak

with accompanying high healthcare costs (Harrison et al., 2018; Morgan et al., 2016; Runciman & Adams, 2003) and unacceptably high rates of residents (one in five) requiring an unplanned hospital admission due to a potentially inappropriate medication (Pharmaceutical Society of Australia, 2019). Medication-related harm remains an ongoing problem for residents living in RACFs.

1.4 Efforts to improve RACF medication management

There have been long-standing efforts to improve RACF medication management over the last two decades, ranging from pharmacist services (discussed in section 1.5), through to accreditation requirements for RACFs as well as legislation, monitoring of quality indicators medication policies and guiding principles. Figure 2 highlights the timeline of these efforts, including recently accelerated efforts, to improve RACF medication management.

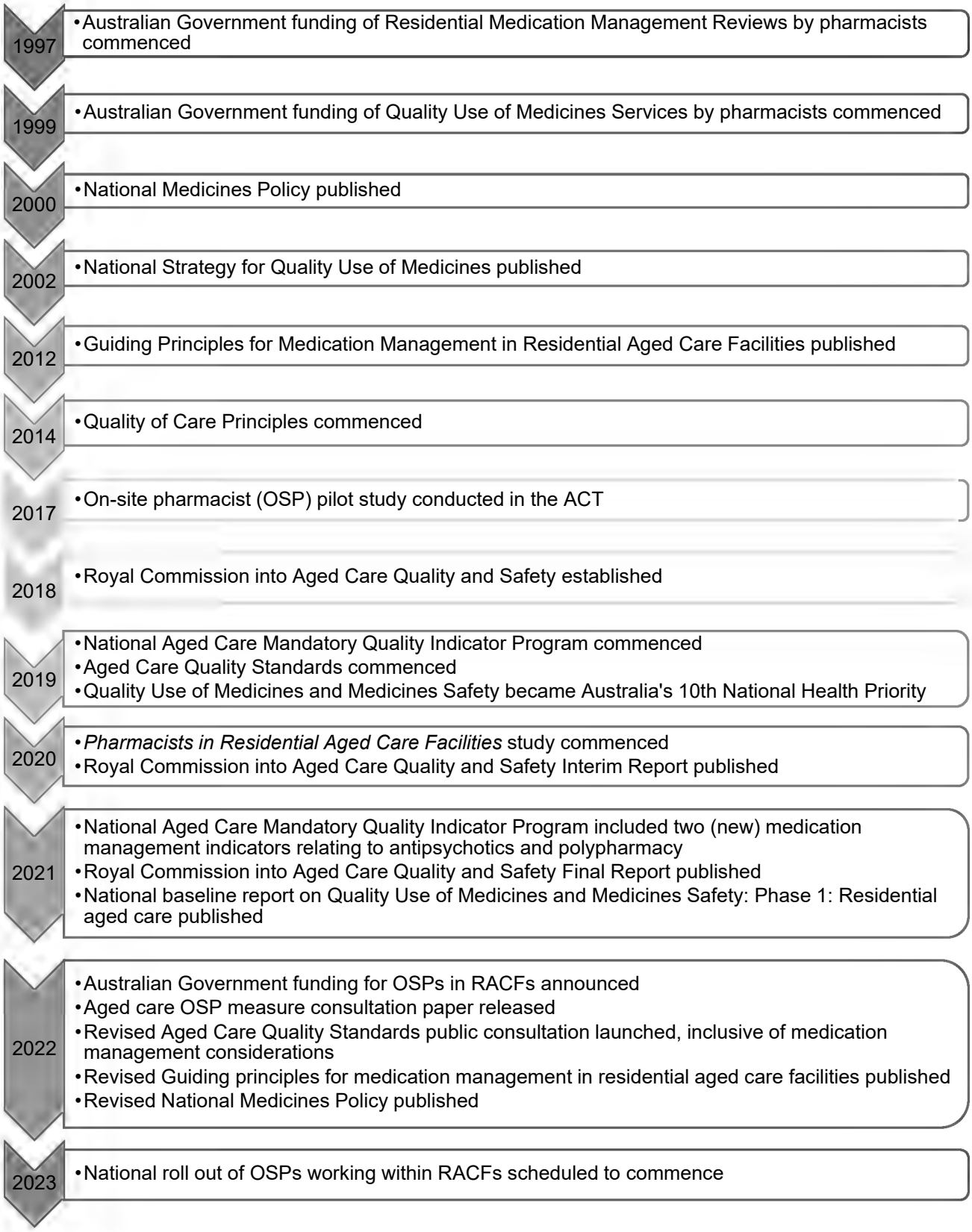


Figure 2: Timeline of efforts to improve RACF medication management that are relevant to this thesis

1.5 Pharmacist services to improve RACF medication management

Current approaches to improving RACF medication management that are relevant to this thesis include the provision of pharmacist services funded by the Australian Government. Two such models of pharmacist services have been in place for the last two decades to support RACF medication management, namely the Residential Medication Management Review (RMMR) and Quality Use of Medicines (QUM) programs. While there have been program rules and changes for the RMMR and QUM Programs, these two programs have remained relatively stable over time.

Residential Medication Management Review

An RMMR is intended to reduce the potential for medication-related problems and improve the use of medicines in collaboration with GPs and residents (Pharmaceutical Society of Australia, 2020a) This definition is consistent with the revised Aged Care Quality Standards which describes medication reviews conducted in RACFs as a collaborative process that allows for medication management assessment and consideration of the resident's perspective (Australian Commission on Safety and Quality in Health Care, 2019). The Australian RMMR program is not unique, with medication review programs in place in the UK (e.g. Medicine Optimisation in Care Homes program), US (e.g. Medication Therapy Management program) and Canada (e.g. MedsCheck program). While all of these programs have similar goals, how they are funded and operationalised varies (Chen et al., 2019; Haider et al., 2021).

The current Australian RMMR program consists of an accredited pharmacist visiting a RACF to conduct a medication review following referral from the resident's GP (Sluggett et al., 2017). GPs are generally permitted to request an RMMR for a resident who has not received an RMMR within the last 12 months (Australian Department of Health and Aged Care, 2022e). As part of conducting the review, the accredited pharmacist may speak with the resident or RACF staff and potentially review available clinical notes on the day of their RACF visit. The accredited pharmacist then provides written recommendations for the GP to consider (Pharmaceutical Society of Australia, 2020a). While there is a requirement for the accredited pharmacist and GP to discuss the recommendations, the frequency at which these discussions occur is not currently known. To conduct an RMMR, pharmacists registered with the Australian Health Practitioner

Regulation Agency (AHPRA) need to undertake additional training to become a Medication Management Review Accredited Pharmacist (accredited pharmacist).

There is some evidence in the current literature that RMMRs may help identify medication-related problems (Chen et al., 2019) and have a modest positive impact upon resident health outcomes (Sluggett et al., 2022). However, this is offset by the fact that according to one Australian study, only 22% of residents received an RMMR within three months of their RACF admission (Sluggett et al., 2021a).

Quality Use of Medicines

In Australia, QUM is commonly understood as a means of supporting the safe and effective use of medications through using medications so as to optimise treatment outcomes whilst seeking to minimise medication-related harm (Australian Department of Health and Aged Care, 2002; Sluggett et al., 2017). The importance of QUM is illustrated by its inclusion as a central pillar of Australia's National Medicines Policy, the overarching document that sets out a high-level framework to support Australians to be able to access and use medications (Australian Department of Health and Aged Care, 2022g).

The intention of the QUM program is for a pharmacist (or service provider) to help individual RACFs address facility-level medication management issues (Pharmaceutical Society of Australia, 2020b). Depending on the needs of the RACF and the pharmacist's experience and skills, QUM program delivery could range from providing education sessions to RACF staff, assisting with medication management policies and procedures, supporting quality improvement activities by undertaking audits, preparing audit reports for RACF consideration, through to participation in the RACF's Medication Advisory Committee (MAC), the committee responsible for oversight of the safe and quality use of medications (Australian Department of Health and Aged Care, 2022d; Pharmaceutical Society of Australia, 2020b).

To date, there is no published research on the QUM program. However, a QUM program evaluation undertaken on behalf of the Australian Government suggested that there is good uptake of the QUM program nationally across diverse geographical locations, socio-economic groups and RACF sizes (URBIS, 2018). This evaluation was not able to quantify the total number of pharmacists delivering or RACFs receiving QUM services across Australia (URBIS, 2018). While most stakeholders interviewed perceived that pharmacists providing QUM

services had a beneficial impact, limitations of this evaluation related to the potential for positivity bias amongst pharmacist respondents and some confusion from RACF respondents as to what the QUM program entailed (as compared to RMMRs) (URBIS, 2018).

1.6 Recent efforts to improve RACF medication management

Recently, there have been commendable efforts to improve RACF medication management, including recent updates to the National Medicines Policy (Australian Department of Health and Aged Care, 2022g), and the *Guiding Principles for Medication Management in Residential Aged Care Facilities* (Australian Department of Health and Aged Care, 2022d), as well as recent consultation on the revised Aged Care Quality Standards (Australian Department of Health and Aged Care, 2022k).

National Medicines Policy

The National Medicines Policy was first published in 2000 with a revised version released in late 2022 (Australian Department of Health and Aged Care, 2022g). The revised policy reaffirms that Quality Use of Medicines and Medication Safety is a central pillar and identified person-centred as the first fundamental principle intended to guide implementation of this policy (Australian Department of Health and Aged Care, 2022g). There are seven enablers identified that will support this policy's success with the first enabler relating to health, digital and medicines literacy (Australian Department of Health and Aged Care, 2022g). This enabler establishes the need to support people's health literacy needs, inclusive of medications, thereby increasing their knowledge, capacity and confidence to make well informed decisions, inclusive of medication-related decisions (Australian Department of Health and Aged Care, 2022g).

The central pillars and principles set out in this policy underpin related documents such as the National Strategy for Quality Use of Medicines, which aims to support the best possible use of medicines (Australian Department of Health and Aged Care, 2002), and three Guiding Principles documents, with the *Guiding Principles for Medication Management in Residential Aged Care Facilities* (Australian Department of Health and Aged Care, 2022d) most relevant to this thesis.

Guiding Principles for Medication Management in Residential Aged Care Facilities

RACF medication management is guided by the *Guiding Principles for Medication Management in Residential Aged Care Facilities* (Australian Department of Health and Aged Care, 2022d). This document was first published in 2012 with a revised version released in late 2022 (Australian Department of Health and Aged Care, 2022d). The revised document contains 15 guiding principles that clearly articulate that improving medication management within RACFs is important, and acknowledges the importance of a person-centred approach and communication about medicines (Australian Department of Health and Aged Care, 2022d).

The person-centred care guiding principle reinforces the need for resident-informed consent, inclusive of being informed about the potential cost of medication and having the opportunity to contribute to medication management decision-making to the extent that they would like to be involved. The communication about medicines guiding principles emphasises the importance of effective communication systems and processes to support residents, family members, on-site RACF staff and visiting staff to interact and discuss medication management matters (Australian Department of Health and Aged Care, 2022d).

The revised Guiding Principles reaffirm that RACFs are expected to comply with medication management obligations and responsibilities stipulated in the National Aged Care Mandatory Quality Indicator Program and Aged Care Quality Standards (Australian Department of Health and Aged Care, 2022d).

National Aged Care Mandatory Quality Indicator Program

The National Aged Care Mandatory Quality Indicator Program assesses the quality of care of residents living in RACFs (Australian Department of Health and Aged Care, 2022f). The importance of improving RACF medication management was demonstrated by the inclusion of medication management – antipsychotics and medication management – polypharmacy as new quality indicators in 2021. This highlights the potential impact of medication management on quality of care, which in turn, has potential impacts on the health and wellbeing of residents living in RACFs (Australian Department of Health and Aged Care, 2022f).

Aged Care Quality Standards

The Aged Care Quality and Safety Commission is responsible for assessment and accreditation of RACFs against the Aged Care Quality Standards, which commenced in July 2019 (Aged Care Quality and Safety Commission, 2021). Before this time, aged care services, including RACFs, needed to comply with the Quality of Care Principles 2014 that set out Accreditation Standards and included medication management requirements (Aged Care Quality and Safety Commission, 2021).

Consultation on the revised Aged Care Quality Standards occurred in late 2022 with medication management considerations outlined under Standard 5 Clinical Care, Outcome 5.3 Medication safety (Australian Department of Health and Aged Care, 2022k). The revised standard states that medication-related risks must be identified, reduced, analysed and acted upon to improve the safe and quality use of medicines. Specific actions range from the need for RACFs to implement systems aligned with evidence-based guidance, ensuring access to medication reviews, through to developing processes to identify, monitor and mitigate risks associated with high-risk medications (Australian Department of Health and Aged Care, 2022k).

However, it is evident that previous iterations of the aforementioned policies and accreditation requirements were not able to adequately address the widespread and ongoing medication management challenges within RACFs. Nor were they able to minimise the extent of medication-related harm experienced by residents living in RACFs (Aged Care Quality and Safety Commission, 2022; Pharmaceutical Society of Australia, 2019).

It is not yet known whether the aforementioned updates and consultations will achieve their intended impact, nor whether this intended impact will occur soon enough to help residents who currently live in RACFs. Thus, it is encouraging that exploration of new ways to improve RACF medication management is well underway, including the potential expanded role of pharmacists within Australian RACFs.

Integrated pharmacists working in RACFs

The Australian Commission on Safety and Quality in Health Care (Commission) is responsible for coordinating and leading national health care improvements to support safe and quality care (Australian Commission on Safety and Quality in Health Care, 2021). Following on from Quality Use of Medicines and Medicines Safety becoming Australia's 10th National Health Priority (Australian Department of Health and Aged Care, 2019), the Commission commenced work on a national baseline report on Quality Use of Medicines and Medicines Safety in RACFs. This work identified ways that would enable QUM principles to become embedded in RACFs, thereby helping to reduce RACF resident medication-related harm (Australian Commission on Safety and Quality in Health Care, 2021). The national baseline report identified 10 priority actions, one of which was the need for further research in relation to the role and impact of embedded pharmacists within RACFs (Australian Commission on Safety and Quality in Health Care, 2021). The *Glossary for the Guiding Principles and User Guide* defined an embedded pharmacist as a pharmacist who is fully integrated in a specific health setting where medication is prescribed, supplied and administered, where applicable (Australian Department of Health and Aged Care, 2022c). The concept of an embedded pharmacist appears to be broadly consistent with the concept of an integrated pharmacist. It has been suggested that an integrated pharmacist is a pharmacist who is co-located within a specific health setting where they work as part of a multidisciplinary health care team to help deliver care through a range of interrelated activities (Shaw & Couzos, 2021). The term integrated pharmacist is used in this thesis as it aligns with the intent and terminology used in the *Pharmacists in Residential Aged Care Facilities* (PiRACF) study, within which this thesis was nested.

The concept of an integrated pharmacist working in health settings such as GP practices (Benson et al., 2018) and Aboriginal Community Controlled Health Organisations (ACCHOs) (Drovandi et al., 2022) is still relatively new in Australia. RACFs are the most recent setting in which an integrated pharmacist has been explored within the Australian health care system, with pharmacists funded to work with UK care homes (comparable to RACFs in Australia) since 2018 (NHS England, 2018). For the purposes of this thesis, the term on-site pharmacist (OSP) is used to describe an integrated pharmacist working within a RACF. The Commission's recommendation for further research on OSPs also aligns with two of the Recommendations

included in the Royal Commission's final report (Royal Commission into Aged Care Quality and Safety, 2021): Recommendations 38 and 64.

Recommendation 38 required that a RACF provider employ at least one pharmacist, as part of health care provision, to support resident assessment and their care plan needs (as required) (Royal Commission into Aged Care Quality and Safety, 2021). Recommendation 64 related to the need to improve resident access to pharmacists delivering quality medication management reviews, including the need for some immediate program changes effective from 1 January 2022 (Royal Commission into Aged Care Quality and Safety, 2021). These recommendations were informed by the Royal Commission's consideration that residents living in RACFs required more access to pharmacists which could potentially help to reduce adverse outcomes associated with poor medication management (Royal Commission into Aged Care Quality and Safety, 2021).

The Australian Government directly responded to these recommendations by announcing funding for OSPs to work in RACFs to improve medication management (Australian Department of Health and Aged Care, 2022i). In July 2022, the Australian Government Department of Health and Aged Care released an aged care OSP measure consultation paper which indicated that OSPs would be rolled out within Australian RACFs from 2023 (Australian Department of Health and Aged Care, 2022b).

1.7 *Pharmacists in Residential Aged Care Facilities* study

The Australian Government has been considering the possibility of OSPs working in RACFs for the last four-five years (Royal Commission into Aged Care Quality and Safety, 2021). This consideration occurred amidst the backdrop of a 2017 pilot study conducted in the ACT, which first identified promising findings when an OSP worked in an Australian RACF (McDerby et al., 2019; McDerby et al., 2020).

Of particular relevance to this thesis is the pilot study's conclusion that the OSP's proximity to the RACF health care team contributed to regular communication and information exchange which supported the quality use of medicines (McDerby et al., 2020). Based upon these findings the (then) Australian Government Department of Health allocated funds to support the

expanded implementation and evaluation of an on-site pharmacist intervention in ACT RACFs which commenced in 2020 (Kosari et al., 2021).

The *Pharmacists in Residential Aged Care Facilities* (PiRACF) study was conducted as a cluster randomised controlled trial. This study sought to evaluate the effectiveness of the OSP intervention in which a part-time OSP was directly employed by a RACF to improve medication management (Kosari et al., 2021). This OSP intervention was complex as it consisted of multiple components that interacted together to support an intended outcome (Craig et al., 2008). Specifically, this OSP intervention sought to improve RACF medication management through key intervention activities delivered at the resident-level and facility-level.

As illustrated in Figure 3, the key overarching OSP intervention activities related to:

- collaboration and communication between the OSP and other stakeholders such as prescribers, RACF staff, residents and family members – inclusive of pharmacist reviews at transitions of care, and medication reviews;
- OSP involvement in clinical governance;
- OSP integration into the RACF health care team; and
- OSP support of quality and safety improvements.

This OSP intervention's focus on these key overarching components align with the revised *Guiding Principles for Medication Management in Residential Aged Care Facilities*, which includes communicating about medicines, clinical governance of medication management, and evaluating and quality improvement in medication management (Australian Department of Health and Aged Care, 2022d). This intervention's central key overarching component of resident-centred care is also consistent with the revised National Medicines Policy's first principle of person-centred (Australian Department of Health and Aged Care, 2022g) and the person-centred guiding principle set out in the *Guiding Principles for Medication Management in Residential Aged Care Facilities* (Australian Department of Health and Aged Care, 2022d).

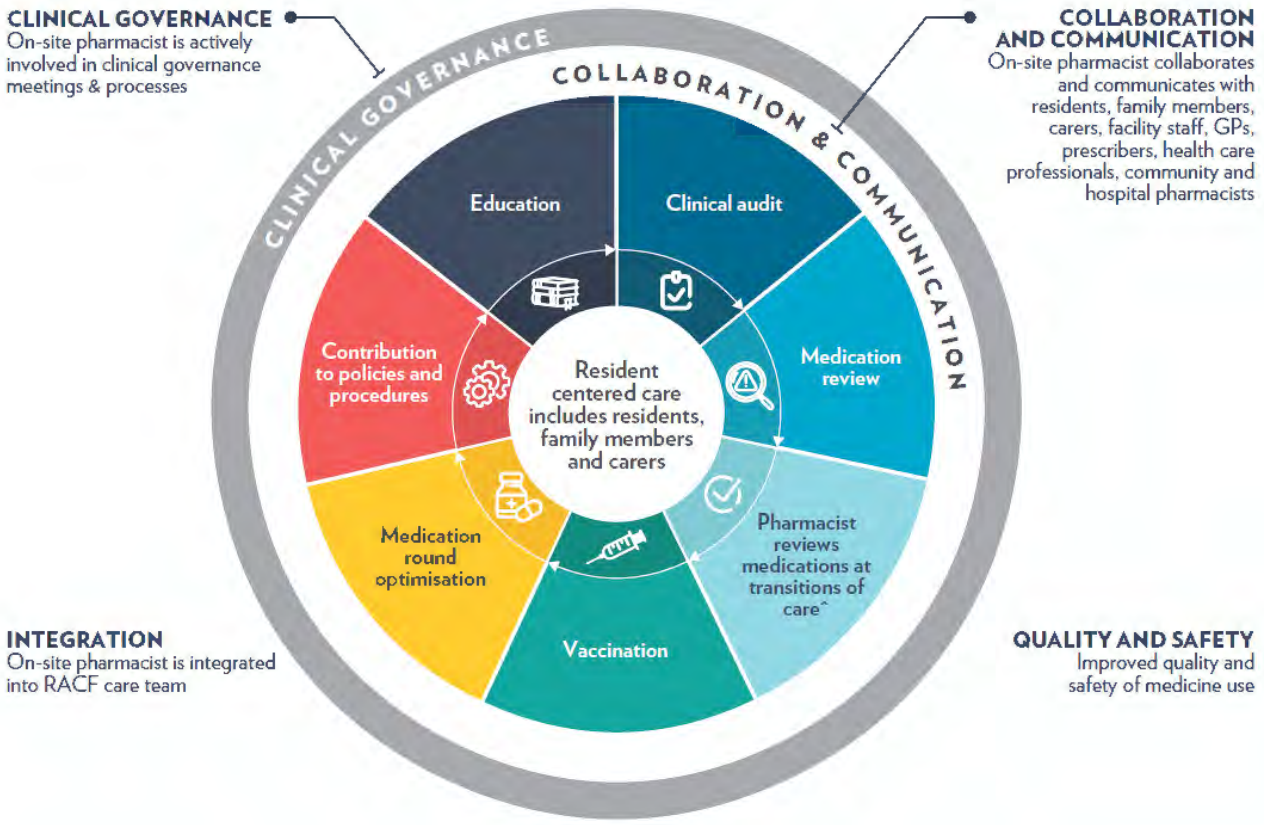


Figure 3: Overview of key overarching OSP intervention activities and sub-activities (Kosari et al., 2022)

To achieve these key overarching OSP intervention activities, a range of specific sub-activities were identified. As illustrated in Figure 3, these sub-activities related to medication review, clinical audit, pharmacist reviews, vaccination, medication round optimisation, contribution to policies and procedures, and education. These sub-activities are within the current scope of practice of pharmacists registered with AHPRA and are broadly consistent with the activities that OSPs were asked to report on via online pharmacist diaries during this OSP intervention.

1.8 Research aim and questions

The overall aim of this thesis was to evaluate key components of an OSP intervention, specifically, interprofessional collaboration, normalisation and implementation fidelity, nested within the PiRACF study context.

These key components were selected as they addressed potential gaps identified in the scoping review reported in Part A (Chapter 3). Namely, that there appeared to be limited

exploration of interprofessional collaboration, limited use of theory to guide evaluation and sparse assessment of implementation fidelity in the current Australian and international evaluated peer-reviewed pharmacist intervention in RACF literature.

To answer the overall aim of this thesis, four research questions were considered:

1. What was the breadth and depth of evaluation approaches, evaluation tools and aspects of implementation used in evaluated peer-reviewed pharmacist interventions in RACFs? (Chapter 3)

2. What was the extent of interprofessional collaboration between OSPs and prescribers, managers and nursing staff and what was the nature of these working relationships? (Chapter 4)

3. What was the extent of OSP normalisation (i.e. OSPs becoming part of routine practice) and how were OSPs normalised? (Chapter 5)

4. What was the implementation fidelity of OSP intervention delivery and what were the moderating factors influencing delivery? (Chapter 6)

1.9 Explication of thesis

The Australian population is ageing. Residents living in RACFs continue to experience medication-related harm. RACF medication management is complex and current efforts to improve medication management are inadequate. The recently accelerated focus on improving RACF medication management creates an opportunity to reimagine approaches to address this problem. One suggested approach is that integrated pharmacists work within RACFs to improve medication management i.e. an OSP intervention. Evaluation of key components of this OSP intervention, namely, interprofessional collaboration, normalisation and implementation fidelity, support an expanded understanding of the OSP role as well as the perceived (or potential) benefits of OSPs working within RACFs to help improve medication management.

1.10 Delimiters

This thesis did not include the PiRACF effectiveness or cost-effectiveness findings that are reported in the PiRACF Study Evaluation Report (Kosari et al., 2022). Nor did this thesis evaluate whether OSPs were integrated within the intervention RACFs or the extent to which the OSP intervention was supportive of person-centred care. Additionally, this thesis did not explore OSP involvement in clinical governance or quality and safety improvements which may have been undertaken as part of the OSP intervention.

1.11 Thesis synopsis

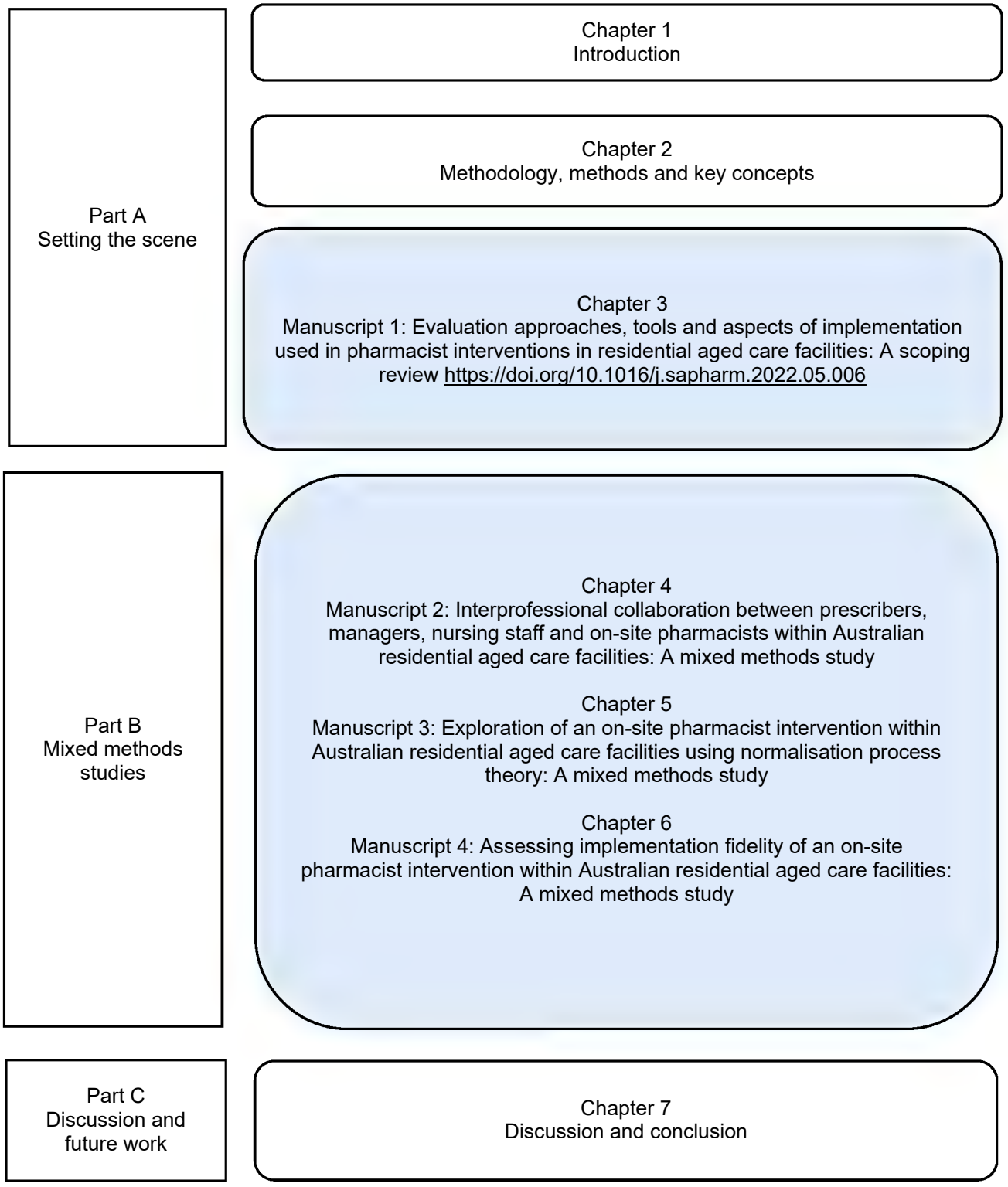
Part A of this thesis focuses on the setting in which this research was undertaken. The current chapter provides background on residents living in RACFs, medication management within RACFs, medication-related harm within RACFs, as well as current approaches and more recent efforts to improve medication management. A description of the PiRACF study (within which this thesis was nested) and a description of this thesis's research aim and questions, and thesis outline were also provided.

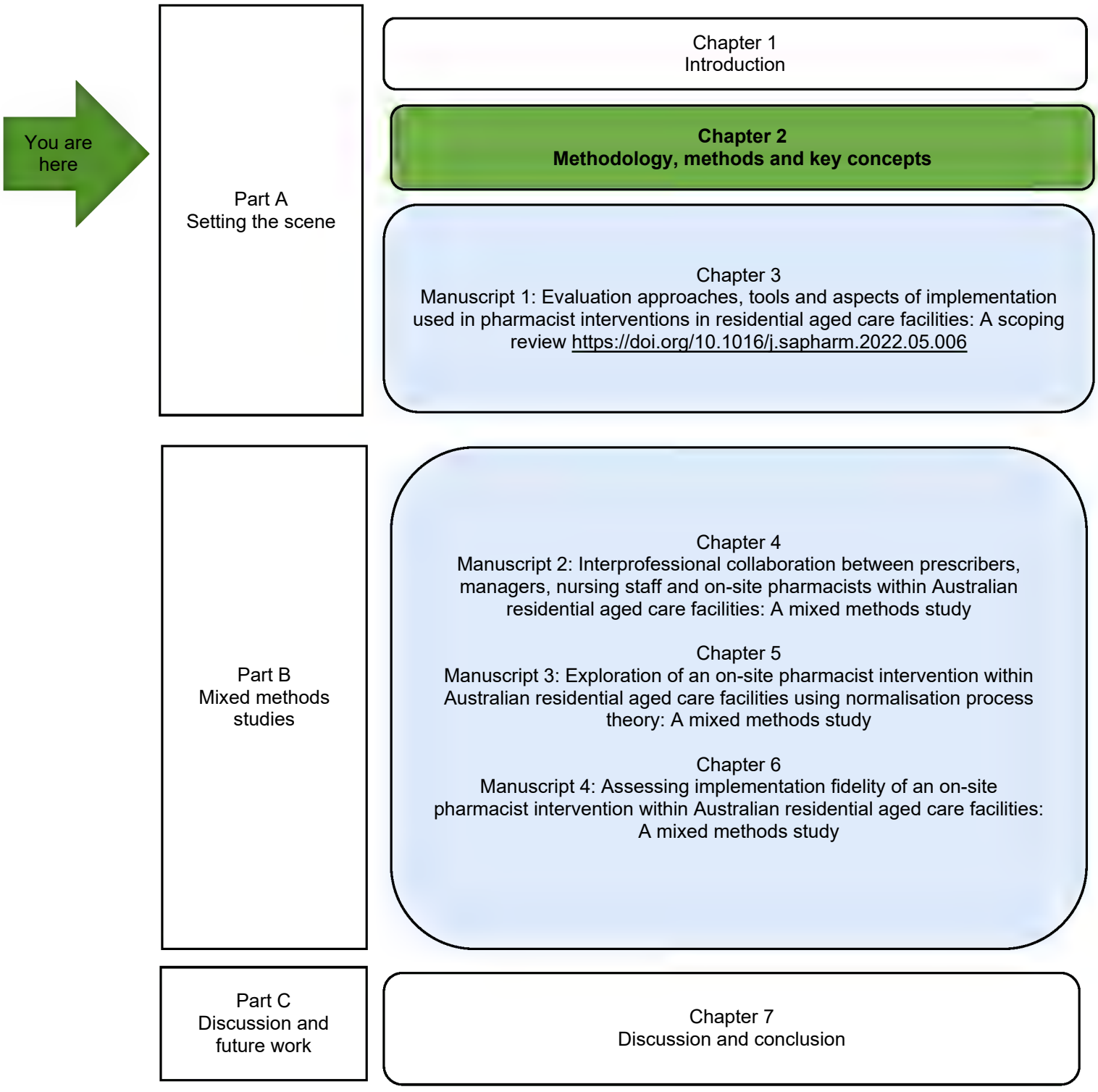
Part A (Chapter 2) describes the methodology, methods and key concepts employed in this thesis. Part A (Chapter 3) reports on a scoping review which identified potential gaps in the current evaluated peer-reviewed pharmacist intervention in RACF literature and guided design of the subsequent mixed methods studies.

Part B of this thesis reports on three mixed methods studies. Part B (Chapter 4) investigates interprofessional collaboration between OSPs and prescribers, managers and nursing staff. Part B (Chapter 5) investigates OSP normalisation within RACFs from the perspectives of residents, family members, OSPs and health care team members. Part B (Chapter 6) assesses the implementation fidelity of OSP intervention delivery and the moderating factors which influenced delivery of the intervention.

Part C of this thesis consists of Chapter 7, which discusses the main findings as well as the strengths and limitations of this thesis. It also outlines the original contribution to knowledge, recommendations for policy and practice and future research directions.

1.12 Thesis outline




You are here
Part A
Setting the scene
Chapter 1
Introduction
Chapter 2
Methodology, methods and key concepts
Chapter 3
Manuscript 1: Evaluation approaches, tools and aspects of implementation used in pharmacist interventions in residential aged care facilities: A scoping review https://doi.org/10.1016/j.sapharm.2022.05.006
Part B
Mixed methods studies
Chapter 4
Manuscript 2: Interprofessional collaboration between prescribers, managers, nursing staff and on-site pharmacists within Australian residential aged care facilities: A mixed methods study
Chapter 5
Manuscript 3: Exploration of an on-site pharmacist intervention within Australian residential aged care facilities using normalisation process theory: A mixed methods study
Chapter 6
Manuscript 4: Assessing implementation fidelity of an on-site pharmacist intervention within Australian residential aged care facilities: A mixed methods study
Part C
Discussion and future work
Chapter 7
Discussion and conclusion

Chapter 2 Methodology, methods and key concepts

This chapter introduces the methodology, methods and key concepts of this thesis, discusses the researcher's philosophy, as well as ethical considerations. It also summarises the methodology, methods and key concepts specific to the mixed methods study reported in Part B (Chapters 4-6).

2.1 Philosophical position

The researcher's approach to conducting this thesis was informed by their positionality and the core values which may have also informed their interpretation of research findings (axiology) (Duffy & Chenail, 2009).

2.1.1 Positionality

The researcher was a registered pharmacist with over 10 years' experience as a public servant in state/territory departments of health. The researcher obtained a Master of Public Health to gain increased exposure to health research and program development. While the researcher had previously worked in hospital and community pharmacy, they positioned themselves as a PhD candidate who was interested in evaluation research. The researcher was not an accredited pharmacist, had not previously delivered Quality Use of Medicines programs to residential aged care facilities (RACFs) and had some prior experience supplying medications to RACFs. However, the researcher did have a solid understanding of medication management within RACFs based on previous working experience.

2.1.2 Values

For this thesis, two core values, namely, curiosity and equity, may have potentially informed the researcher's research journey:

- Curiosity – The researcher constantly strived to see the world through a lens of curiosity with a genuine interest in trying to understand the why and how of things. Subsequently, as the researcher learnt more as part of this thesis, the researcher became even more curious about what was not yet known (Loewenstein, 1994). This then provided

opportunities to incorporate research knowledge from different contexts into the mixed methods studies conducted as part of this thesis.

- Equity – The researcher believed that no residents living in RACFs should be at higher risk of, or be more likely to experience medication-related harm compared to older people living in the community. The researcher also believed that residents and family members have the right to equitable access to medication knowledge and to be able to participate in discussions about medication management decisions (to the extent that they wish to). However, the researcher recognised that based on their own observations within RACFs, and consistent with the broader literature, residents' and family members' voices are not always heard equitably and they may not feel empowered in relation to medication-related decisions (Hughes & Goldie, 2009; Nizaruddin et al., 2017).

Critical examination of the researcher's philosophical position and core values when designing this thesis helped the researcher to identify potential biases. Subsequently, the researcher designed and conducted ethically sound research studies that were aligned with the researcher's core values and were consistent with a suitable research paradigm.

2.2 Research paradigm

The research paradigm chosen by a researcher informs the lens and processes through which they investigate and make sense of their phenomenon of interest (Patton, 2015; Weaver & Olson, 2006). Each research paradigm is underpinned by specific beliefs about the nature of reality (ontology), beliefs about knowing the world (epistemology) (Bunniss & Kelly, 2010; Kaushik & Walsh, 2019) and beliefs about how to conduct research so that it 'makes sense' (methodology) (Braun & Clarke, 2013).

It is widely accepted that the most common research paradigms are constructivist/interpretive and positivist (Creswell & Plano Clark, 2017; Patton, 2015). The constructivist/interpretive research paradigm is often used in qualitative method studies and is commonly underpinned by a focus on the participant's subjective reality within a specific context (Feilzer, 2009; Patton, 2015; Schwandt, 2000). By contrast, the positivist research paradigm is more often used in quantitative method studies and seeks to test or generate deductive and objective findings (Feilzer, 2009; Patton, 2015). For this thesis, as quantitative and qualitative research methods

were both used, neither an exclusively constructivist/interpretive or positivist research paradigm was considered suitable. Instead, a third research paradigm, pragmatism, was considered to be the best fit for this research.

2.2.1 Pragmatism

Pragmatism was first conceptualised in the US more than 100 years ago (Cornish & Gillespie, 2009; Ormerod, 2006). It is a research paradigm that promotes the selection of a research design and methodology best suited to addressing a study's research questions (Kaushik & Walsh, 2019; Mertens & Tarsilla, 2015). Pragmatism considers that knowledge is both constructed and informed by the real-world (Johnson & Onwuegbuzie, 2004). This research paradigm advocates for the combination of varying perspectives, methodologies, methods and analysis techniques when necessary (Feilzer, 2009). A pragmatic research paradigm is generally well suited to health research as this work often seeks to address real-world problems and often focusses on the day-to-day experiences of participants (Cornish & Gillespie, 2009).

2.2.1.1 Rationale for using pragmatism

Using a pragmatic research paradigm for this thesis was appropriate given that the research related to an OSP intervention in real-world RACFs. A combination of quantitative and qualitative methods was generally required to address this thesis's research questions. Furthermore, a key aspect of pragmatism is that it requires researchers to be curious (Feilzer, 2009), a core value of the researcher. Pragmatism also necessitates that researchers remain committed to uncertainty (Feilzer, 2009). Thus, it is argued that pragmatism was a highly suitable paradigm for this thesis, as much of this research was conducted during an unprecedented time of uncertainty, namely, the COVID-19 pandemic.

2.2.2 Mixed methods design

Pragmatism has been described as the 'philosophical partner' of mixed methods studies (Johnson & Onwuegbuzie, 2004, p. 16) because they are studies where quantitative and qualitative approaches are integrated to adequately answer their research questions (Kaushik & Walsh, 2019). Mixed methods research studies often focus on 'what and why' or 'what and how' in such a way as to provide findings that are more expansive than their individual components (Woolley, 2009). In other words, these studies can optimise the respective

strengths of these two approaches (Fetters et al., 2013) and offset each approach's methodological weaknesses (Miles et al., 2020). The qualitative method supports a depth of understanding as to 'why' with respect to observed patterns, and the quantitative method supports a breadth of understanding specific to observed patterns suspected to be of relevance (Busetto et al., 2020; Patton, 2015).

When designing mixed methods studies, consideration must be given to why different components are required (Woolley, 2009). The relative weight of the qualitative and quantitative components also needs to be considered (Creswell, 2015). When describing mixed methods studies, capitalisation is used to reflect which component is dominant or whether they are of equal importance. For example, a qualitative-dominant mixed method study is identified as a 'QUAL–Quan' study and a study using qualitative and quantitative data that assigns equal importance to each is identified as a 'QUAN–QUAL' study (Creswell, 2015). Consistent with the researcher's own curiosity in understanding the 'why' of things, the mixed methods studies reported in this thesis are predominately qualitative dominant.

2.2.2.1 Rationale for using mixed methods design

As described in Part A (Chapter 1), after having undertaken a scoping review, this thesis sought to evaluate key components of an OSP intervention within real-world RACFs, namely, interprofessional collaboration, normalisation and implementation fidelity. This thesis sought to answer research questions relating to why and how these key components of the OSP intervention were implemented. It is argued that an overall mixed methods approach was suitable for this thesis as more than one method was required to help answer this thesis's research questions.

The use of a mixed methods approach was also appropriate given that this OSP intervention was a complex intervention that sought to improve medication management within RACFs. By using a mixed methods approach, it was possible to better understand the complexity associated with the phenomenon being investigated (Uprichard & Dawney, 2019). This then meant that the researcher gained a more comprehensive and enriched understanding of the phenomenon of interest (Glenton et al., 2011; Greene et al., 1989).

Furthermore, a mixed methods approach was considered to be the best fit for this research because the researcher was aware of, and pro-actively addressed, two key challenges inherent

in using this approach. The most significant challenge related to the importance of collaboration with an experienced mixed methods researcher when designing and undertaking rigorous mixed methods studies (Wisdom & Creswell, 2013). To overcome this challenge the researcher worked with their supervisory panel which consisted of researchers with experience across qualitative, quantitative and mixed methods methodologies. There was also the potential for resource burden on the researcher noting the need to develop, collect and analyse the qualitative and quantitative components and ensure their adequate integration (Hadi & Closs, 2016). The researcher took all reasonable steps to allow for adequate time to fully consider the qualitative, quantitative and integrated findings for the mixed methods studies reported in Part B (Chapters 4-6).

2.2.3 Study design

Four mixed methods study designs have been broadly proposed – triangulation, embedded, sequential and multiphase (Creswell & Plano Clark, 2010). While mixed methods study designs continue to be refined and evolve over time, an embedded design is commonly understood to be a study where one component is the focus (Hadi & Closs, 2016; Schoonenboom & Johnson, 2017). The other component then provides a supporting role to enhance the study design, with data collected at the same time or in sequence, to help answer different research questions in one study (Hadi & Closs, 2016; Schoonenboom & Johnson, 2017). For the first two mixed method studies reported in Part B (Chapters 4-5), an embedded design was used to answer their respective research questions.

Triangulation design can be used in various ways, with concurrent triangulation design also known as convergent parallel design (Edmonds & Kennedy, 2017). A convergent parallel design is when qualitative and quantitative data are collected and analysed independently, and it is well suited to triangulate complementary data (Hadi & Closs, 2016; Schoonenboom & Johnson, 2017). For the final mixed methods study reported in Part B (Chapter 6), a convergent parallel design approach was employed; the focus of this study was on triangulation of data to fully answer this study's research questions. Figure 4 illustrates the embedded and convergent parallel study designs used in the mixed methods studies reported in this thesis.

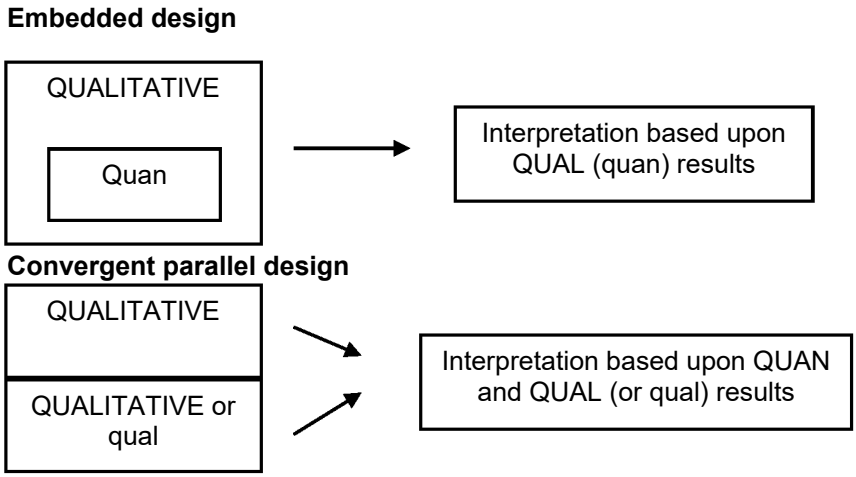


Figure 4: Embedded design and convergent parallel mixed methods design (adapted from Creswell and Plano Clark, 2010 and Edmonds and Kennedy, 2017)

2.2.4 Integration

A fully realised mixed methods study requires integration of qualitative and quantitative components to occur at least once (Schoonenboom & Johnson, 2017). Integration may be used to support triangulation, complementarity, development, initiation or expansion (Greene et al., 1989; Hadi et al., 2014; Schoonenboom & Johnson, 2017). A complementarity approach aims to enhance, elaborate or clarify results arising from one method through the use of a second method (Hadi et al., 2014; Schoonenboom & Johnson, 2017). The mixed methods studies reported in Part B (Chapters 4-6) used a complementary approach to enhance understanding of the phenomenon of interest.

2.2.5 Integration stage

It is possible for mixed methods integration to occur at various study stages such as the design stage, the methods stage, and the interpretation and reporting stage (Fetters et al., 2013). Consistent with the broader literature, the mixed methods studies reported in Part B (Chapters 4-6) integrated the qualitative and quantitative data at the interpretation stage (Fetters et al., 2013; Greene et al., 1989). Integrated data findings for each mixed methods study and the 'fit' of integration, that is, the relationship between the quantitative and qualitative data at the point of integration (Fitzpatrick, 2014) were individually reported in Part B (Chapters 4-6).

2.2.6 Mixed methods reporting guidelines

There are a number of mixed methods reporting guidelines available (Hadi et al., 2014; Leech & Onwuegbuzie, 2010; O'Cathain et al., 2008; Schifferdecker & Reed, 2009) from the EQUATOR website (www.equator-network.org). However, to date, there is no gold standard. When reporting on mixed methods study findings, which related to an OSP intervention in real-world RACFs, recommendations made by Hadi et al. to improve mixed methods research reporting for pharmacy practice researchers were used (Hadi et al., 2014). These recommendations were adapted and modified for the pharmacy practice context based upon Creswell and Plano's seminal work on the design and conduct of mixed method research (Creswell & Plano Clark, 2017).

2.3 Qualitative approach

In this thesis, the researcher explored the current issues contributing to the poor reporting quality of qualitative studies associated with randomised controlled trials. To address the issues of unclear linkages between findings and poor data integration (Lewin et al., 2009; O'Cathain et al., 2008), applicable data integration approaches were considered in sections 2.2.4 and 2.2.5. To address the issue of poor descriptions of the qualitative methods and methodological approach used (Lewin et al., 2009; O'Cathain et al., 2008), this section will now describe the qualitative approaches used for the mixed methods studies.

There are a range of qualitative research methodologies and data analysis approaches (Miles et al., 2020). The selection of a suitable approach may be informed by the research questions being asked, and the lens through which the study is being explored, as well as the phenomenon of interest itself. The three most commonly used qualitative approaches are ethnography (with its culture focus), phenomenology (with its lived experience focus) or ground theory (with its theory building focus) (Bradshaw et al., 2017).

Ethnography seeks to understand and explain what it is like to be a person within a particular culture (Doody & Bailey, 2016). Phenomenology seeks to understand and describe a person's experiences and allows for the researcher and participant's interpretation of these experiences (Doody & Bailey, 2016; Rodriguez & Smith, 2018). Grounded theory seeks to discover and develop theory that is, as the name suggests, grounded in the qualitative data collected by the researcher (Doody & Bailey, 2016). For this thesis, as specific research questions were being

asked to understand participant perspectives and experiences in relation to an OSP intervention in real-world RACFs, ethnography, phenomenology and grounded theory were not considered suitable. Instead, a qualitative descriptive approach was considered to be the best fit for this research.

2.3.1 Qualitative descriptive

Qualitative descriptive (QD) is less known than other qualitative approaches (Doyle et al., 2019). It is most suited to studies that focus on broadly describing the experiences of participants in their own words in way that is easily understood (Bradshaw et al., 2017; Doyle et al., 2019). Thus, QD is particularly beneficial when the phenomenon of interest is not well understood but it is important to broadly understand the why, what, who and where of participant's experiences (Kim et al., 2017). While QD has been described as the least theoretical qualitative approach, it is the most suitable approach to use if the study requires a rich and clear description of a participant's experience (Neergaard et al., 2009). QD does not provide a short-cut to conducting qualitative research (Sandelowski, 2010). Instead, it provides an opportunity for researchers to produce findings that are close to the data, within the context of narrative analysis. The perceived lack of credibility sometimes associated with using QD (Neergaard et al., 2009) is addressed in section 2.3.4.4.

2.3.1.1 Rationale for using QD

QD was considered to be the best fit for this research as it is often employed within mixed methods studies in health research that seek to understand participants' experiences and views in relation to a phenomenon of interest (Neergaard et al., 2009). Importantly, the researcher understood that QD would not necessarily take less time and be less resource intensive compared with other qualitative approaches (Doyle et al., 2019; Neergaard et al., 2009). QD was also considered highly suitable as purposive sampling and semi-structured interviews, the qualitative sampling and data collection method used in this thesis, are commonly employed in studies using QD (Neergaard et al., 2009).

2.3.2 Framework analysis

Thematic or content analyses are the most common ways to analyse qualitative data in studies using QD (Bradshaw et al., 2017; Kim et al., 2017). While the researcher initially planned to

use content analysis, as the interviews approached, it became clear that framework analysis approach would be more suitable.

Framework analysis was first developed in the 1980s by Ritchie and Spencer (1994). Sometimes referred to as 'the framework method' or 'framework approach', this analytic approach was initially employed in social policy research, and its use has since expanded into health research (Gale et al., 2013). As illustrated in Figure 5, framework analysis provided the researcher with a systematic and highly structured approach to analysing, managing and identifying themes for the qualitative component of each of the mixed methods studies (Hackett & Strickland, 2018; Ritchie & Spencer, 1994).

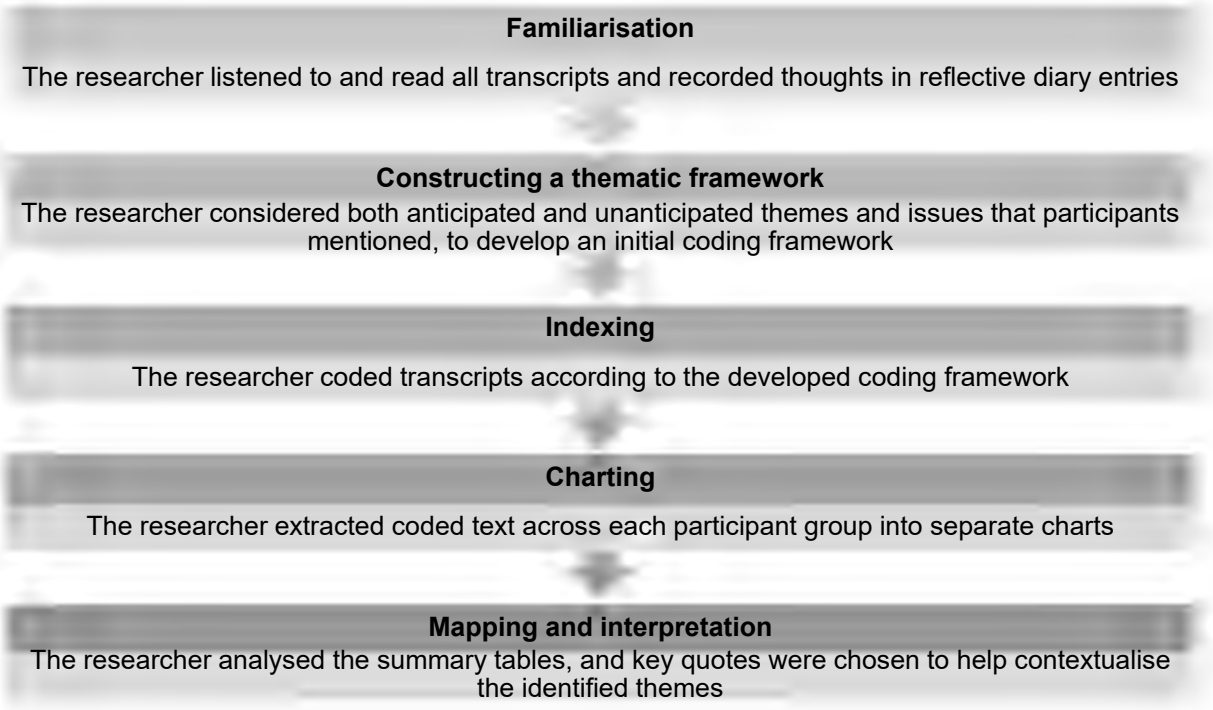


Figure 5: Framework analysis steps used by the researcher (adapted from Ritchie and Spencer, 1994 and Hackett and Strickland, 2018)

2.3.2.1 Rationale for using framework analysis

As framework analysis is not aligned to a specific philosophical, theoretical or epistemological approach (Gale et al., 2013); its use is consistent with the pragmatic approach taken for this thesis. Framework analysis was also considered highly suitable because of its potential to adequately handle a large volume of qualitative data and provide a descriptive, holistic understanding of the full data set (Gale et al., 2013).

The researcher explicitly selected framework analysis as it would enable them to become immersed in their data, including being able to identify patterns across participants and participant groups and within the emerging themes (Gale et al., 2013). Alternative approaches, such as content analysis, were considered less suitable choices due to the anticipated volume of qualitative data and the researcher's preference to engage with the data in multiple ways so that they could better understand individual and group participant perspectives.

This choice was clearly justified once the researcher began analysing the qualitative data and found that framework analysis helped them to gain an expanded breadth and depth of understanding of participant experiences (Gale et al., 2013). This approach was also suitable given that it allowed for the qualitative datasets to be readily analysed for three different mixed-methods studies with varying foci, datasets selected and research questions. The researcher was also aware of, and pro-actively addressed, a key challenge inherent in using this analysis approach, namely, the need for experienced guidance given its systematic approach (Gale et al., 2013; Hackett & Strickland, 2018). One supervisor and one advisor, highly experienced qualitative researchers with previous framework analysis experience, provided this expert guidance to the researcher for the mixed method studies reported in Part B (Chapters 4-6).

2.3.3 Qualitative reporting guidelines

There are a number of qualitative study reporting guidelines available with no specific gold standard recognised to date (Busetto et al., 2020). For the qualitative component of each of the mixed methods studies reported in this thesis, the Consolidated criteria for reporting qualitative research (COREQ) was chosen given its three domains (research team and reflexivity; study design; and analysis and findings), as well as its suitability for assessing semi-structured interview data (Tong et al., 2007). Additionally, COREQ is commonly used in pharmacy practice research (Page et al., 2017; Williams et al., 2020). Further description of how the quality of the qualitative data was maintained is provided in section 2.3.4.

2.3.4 Qualitative quality

There are various guidelines available for assessing the quality of qualitative findings and finding conclusions (Miles et al., 2020). In this section, six key quality aspects of qualitative

quality will be further considered. The first relates to reflexivity. The other five, informed by Lincoln and Guba's trustworthiness concept (Lincoln & Guba, 1985), are objectivity, reliability, credibility, transferability and application (Miles et al., 2020).

2.3.4.1 Reflexivity

Reflexivity is important for all qualitative studies, as it helps researchers critically reflect on their impact (potential or actual) on how they interpret qualitative findings (Newton et al., 2012; Varpio et al., 2017). It also provides an opportunity for researchers to explicitly consider their influence on the study, ranging from research participants to study design (Newton et al., 2012; Varpio et al., 2017). Reflexivity requires a self-awareness that goes beyond considering one's researcher stance and potential bias.

To support ongoing reflexivity, the researcher completed a templated contact summary sheet after each semi-structured interview to contemporaneously document the researcher's reflections and track the progression and understanding of the answers to the study's research questions (Miles et al., 2020). As illustrated in Figure 6, the researcher also maintained a reflective diary to record their research process and reflect upon their thoughts at each study stage (Patton, 2015).

Really encouraged by the positive feedback on the depth of qual data from extract of transcript … I was really happy that I was able to interview another family member, I really hope that I can get further engagement on that front as it's so important to ensure that the model works for them and also for residents! *– reflective diary entry extract, 23 September 2021*

One thing which has really stuck with me recently is that at the last GP interview the GP suggested that stakeholders get together before the OSP started at the RACF to work out expectations, OSP authority so that their knowledge could be utilised as much as possible.
In hindsight, it was unfortunate that I wasn't able to start my PhD studies before the [Pharmacists in Residential Aged Care Facilities] PiRACF study commenced as it would have been fascinating to have found out beforehand what people felt "integrated pharmacist" actually meant and the practical implications of this integration i.e. expectations, roles, responsibilities; and then have compared their expectations and impressions of what an "integrated pharmacist" was pre and post – but alas, that didn't occur. It was fascinating that this GP shared this insight
– reflective diary entry extract, 29 October 2021

Really, really pleased that coding, summary table and theme development slide deck completed!!! Have felt that have really had gotten a good handle on the data courtesy of framework analysis, and with additional dive into the literature have also gained some really valuable insights into potential sensitising concepts and similarities/differences in findings compared with other studies
Next step – thinking about data integration piece, manuscript skeleton refinement based upon target journals *– reflective diary entry extract, 19 November 2021*

Such a pleasure to be coding resident and family member interviews – so many diverse perspectives and yes, a decent amount of tangential conversations, but fascinating content none the less. There's

so much rich data… The main themes at the moment relate to… importance of residents having access to knowledge about medication and medication changes; family members being supported by OSPs providing information so that they can have meaningful decision- making conversations with GPs etc. – reflective diary entry extract, 10 February 2022

Figure 6: Sample reflective diary entry extracts written between September 2021 and February 2022

2.3.4.2 Objectivity

Before commencing qualitative research it is important to articulate the researcher's potential bias (Miles et al., 2020). When undertaking research for this thesis, the researcher needed to acknowledge that their background as a registered pharmacist informed the design and approach taken for the mixed methods studies reported in this thesis. The contextual knowledge of health care team interactions and RACF challenges, alongside review of the current literature, informed the development of semi-structured interview guides for the mixed methods studies.

On the other hand, there is the potential for bias due to this contextual knowledge. That is, the researcher might consider the qualitative data from a predetermined position instead of fully exploring the phenomenon of interest from the participant's perspective. The researcher was aware of and pro-actively sought to minimise this potential for bias. Specifically, the researcher ensured that there was careful consideration of qualitative data and in-depth engagement with the topic through regular discussions with the researcher's supervisory panel during the data analysis process (Yardley, 2017). During these discussions, the researcher was deeply immersed in the data, consistent with an insider role, with the potential implication of becoming too closely aligned to the data and losing the necessary broader perspective required of a qualitative researcher (Gioia et al., 2012). To offset this, the researcher pro-actively engaged with their supervisory panel, particularly the expert qualitative supervisor and advisor, so that they could provide a 'devil's advocate' outsider perspective through review and critique of the researcher's data analysis i.e. from coding framework development through to theme development (Gioia et al., 2012).

2.3.4.3 Reliability

The researcher explored the pharmacist intervention in RACFs and the broader health literature when developing clearly defined research questions and pragmatically designing each mixed methods study to best answer this thesis's research questions (Miles et al., 2020).

Furthermore, an existing theory, framework and model were employed in the mixed methods studies reported in this thesis, with further details provided in section 2.5. All reasonable attempts were made to ensure the reliability of the qualitative data for the mixed methods studies through using a wide range of communication mediums, i.e. face-to-face, telephone and online interviews (Miles et al., 2020). In this way, a fuller understanding of the context and phenomenon of interest was gained through seeking the perspectives of multiple participants across multiple intervention RACFs (Miles et al., 2020).

2.3.4.4 Credibility

To support the credibility of the mixed methods studies reported in Part B (Chapters 4-6), a purposive sampling approach was employed (Palinkas et al., 2015). Furthermore, the qualitative methodology and data collection method were designed to gather rich contextual data that was meaningful to the phenomenon of interest (Miles et al., 2020). The qualitative data were considered according to an existing theory, model or framework respectively to increase the credibility of the qualitative findings (Miles et al., 2020), with further details described in section 2.5. Regular discussions with the researcher's supervisory panel during the data analysis process was also important as a means to increase credibility and confidence in the qualitative study findings (Yardley, 2017).

2.3.4.5 Transferability

The researcher understood the importance of adequately describing the study participants and study context so that it would be possible to compare the qualitative findings of the mixed methods studies with other groups (Miles et al., 2020). Increasing the potential for the qualitative findings and outcomes to be applied to other health settings was an important consideration (Miles et al., 2020), primarily facilitated through the use of an existing theory, model and framework. Policy and practice implications, and future research recommendations arising from this thesis are outlined in Chapter 7.

2.3.4.6 Application

The researcher recognised the need to balance obtaining insights from health care team members within RACFs and the potential direct and indirect impacts upon care for residents living in RACFs which may occur due to this process. This potential impact was further

heightened during the 2020 and 2021 COVID-19 lockdowns in the ACT and likely contributed to lower than anticipated survey response rates for the first two mixed method studies. By undertaking the research for this thesis, the researcher's usable knowledge of research within the PiRACF study setting increased (Miles et al., 2020). This usable knowledge, which specifically related to the evaluation of key components of an OSP intervention in real-world RACFs, was disseminated through a range of communication mediums, such as peer-reviewed publications, conference presentations and the PiRACF Study Evaluation Report.

2.3.4.7 Qualitative summary statement

Through all stages of this thesis, from planning through to reporting and dissemination of findings, the researcher has positioned this research as providing a significant and valuable original contribution to knowledge. By undertaking the research for this thesis, the researcher has ultimately established an objective, reliable, credible, authentic and trustworthy voice informed by the qualitative data collected, analysed and interpreted in the mixed methods reported in Part B (Chapters 4-6). Moreover, Part A (Chapter 1) has clearly described the research setting of this thesis, an OSP intervention nested within the PiRACF study, with section 2.3.4.2 articulating the researcher's impact upon the mixed methods studies.

2.4 Quantitative approach

For the mixed methods studies reported in Part B (Chapters 4-6), the researcher also collected, analysed and interpreted applicable quantitative data. It is essential that any quantitative research has both internal and external validity (Patino & Ferreira, 2018). For the purposes of this thesis, internal validity was achieved through adapting surveys informed by an existing theory or model. Face validity for the adapted surveys were also tested with a GP and a nurse with experience in aged care.

External validity, which relates to the generalisability of research findings in the real-world, was addressed through a number of mechanisms (Patino & Ferreira, 2018). The potential threat to external validity through setting characteristics was addressed through the surveys for health care team members in RACFs being distributed at different intervention RACFs using a staggered approach. Confounding factors, such as the COVID-19 pandemic, COVID-19 lockdowns and additional interventions being concurrently introduced into the intervention

RACFs during the 12-month intervention period, were outside the researcher's control. These confounding factors are reported, where applicable, in Part B (Chapters 4-6). SPSS (IBM SPSS Statistics for Windows) was used to assess inter-rater reliability for the scoping review reported in Part A (Chapter 3), conduct a 2-tailed independent sample t-test for the mixed methods study reported in Part B (Chapter 4) and assess intraclass correlation coefficient for the mixed methods study reported in Part B (Chapter 6).

2.5 Key concepts underpinning this thesis

This section introduces the key concepts that underpin this thesis, specifically, interprofessional collaboration, normalisation and implementation fidelity. Here, a concept is defined as a theoretical construct, idea or notion (Macquarie Dictionary Online, 2016). This section also outlines the rationale for using McDonough and Doucette's conceptual model for the development of pharmacist-physician collaborative working relationship, Normalisation process theory, and Hasson's conceptual framework for implementation fidelity for the mixed methods studies reported in Part B (Chapters 4-6).

2.5.1 Interprofessional collaboration

The term collaboration has been conceptualised by various researchers over the years, most notably, by Sullivan (1998), Orchard et al. (2012), Bronstein (2002) and D'Amour et al. (2005). Sullivan's model of collaboration focussed on a dynamic process culminating in partnerships and shared power wherein collaborative characteristics, defined as a distinguishing trait of feature (Macquarie Dictionary Online, 2016) and attributes, defined as something belonging to a characteristic (Macquarie Dictionary Online, 2016) were informed by the findings of a concept analysis (Sullivan, 1998). Based upon Sullivan's model, Orchard et al developed the Assessment of interprofessional team collaboration scale (AITCS) (Orchard et al., 2012), a 47-item tool followed by the AITCS-II, a 23-item tool (Orchard et al., 2018). Orchard et al.'s model of collaboration comprised of coordination, cooperation, shared decision-making and partnerships (Orchard et al., 2012).

Bronstein's model of interdisciplinary collaboration also focussed on five key collaboration characteristics (interdependence, newly created professional activities, flexibility, collective ownership of goals, and reflection on process) (Bronstein, 2002). According to D'Amour et al.'s conceptual basis for interprofessional collaboration, collaboration requires collective

action, team members whose perspectives are integrated and mutual trust and respect (D'Amour et al., 2005). Informed by a review of the existing collaboration literature, D'Amour et al. proposed that collaboration comprises of five characteristics (sharing, partnership, power, interdependency, and process) (D'Amour et al., 2005). These four collaboration models highlight the range of collaboration definitions and tools available to measure collaborative practice within health settings.

The term interprofessional is used in this thesis instead of multidisciplinary or interdisciplinary, as interprofessional more explicitly illustrates that collaborative processes within health care require different professional groups to work together to positively impact health care (Zwarenstein et al., 2009). This approach aligns with the definition of a profession as a collective of individuals who are committed and engaged in delivering specific outcomes (Parse, 2014). In contrast, a discipline is commonly described as a body of knowledge that informs research and related activities e.g. education (Parse, 2014). The definition of interprofessional collaboration used in this thesis is also consistent with the World Health Organization's stance on collaborative practice, namely, that collaborative practice occurs when multiple health workers from varying professions work together in conjunction with communities, carers and patients to enable high-quality delivery of care (Health Professions Networks Nursing & Midwifery Human Resources for Health, 2010). It is commonly accepted that interprofessional collaboration can support improved health systems (Valentijn et al., 2015), and it has been suggested that the interprofessional collaboration amongst prescribers, nursing staff and pharmacists can potentially help reduce medication-related harm within RACFs (Sadeq et al., 2022).

Effective prescriber and pharmacist interprofessional collaboration has previously been identified as a key factor influencing the success of pharmacist interventions in primary care (Bollen et al., 2019). As such, it is not surprising that there is a range of collaboration models that have tended to focus on prescriber and pharmacist collaboration, that could potentially underpin this thesis. McDonough and Doucette's conceptual model for the development of pharmacist-physician collaborative working relationship (CWR) has previously been identified as the most frequently used conceptual framework to explore physician and pharmacist interprofessional collaboration (Bardet et al., 2015).

2.5.2 McDonough and Doucette's conceptual model

McDonough and Doucette's conceptual model for the development of pharmacist-physician CWR describes the relationship between a pharmacist and physician. CWR reflects the stance that collaboration is a staged process that evolves iteratively over time across five stages, as illustrated in Figure 7.

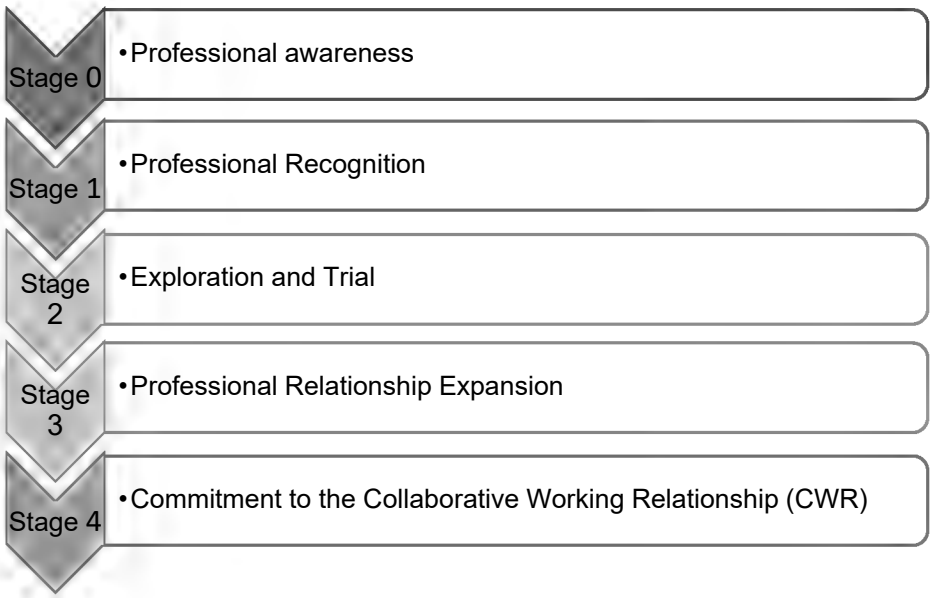


Figure 7: Staged approach to developing collaborative working relationships between pharmacists and physicians (McDonough and Doucette, 2001)

This staged approach to developing CWR between physicians and pharmacists is informed by three drivers: participant characteristics, such as individual characteristics, attitudes, knowledge and beliefs and professional experience; context characteristics, such as physical proximity and volume of interactions between participants; and exchange characteristics, such as openness and communication channels, expectation development and performance assessment (McDonough & Doucette, 2001).

2.5.2.1 Rationale for using McDonough and Doucette's conceptual model

Several collaboration models were not considered suitable as an underpinning key concept for this thesis as they tended to focus on GP and community pharmacist interactions. Examples included the community pharmacist attitudes towards collaboration with GPs model, which was informed by GP and community pharmacist interviews as well as the existing collaboration literature (Van et al., 2012), and the conceptual model of GP-community pharmacists

collaboration which was informed by GP and community pharmacist interviews (Bradley et al., 2012). These collaboration models were not considered to be readily transferable to the research setting of this thesis, an OSP intervention nested within the PiRACF study.

By contrast, CWR was informed by existing models and findings inclusive of nursing and prescriber collaborations and was not limited to the experience of physicians (i.e. prescribers such as GPs) and community pharmacists (McDonough & Doucette, 2001). It is argued, then, that CWR is particularly suited for use within this thesis given its capacity to help conceptualise interprofessional CWRs beyond the prescriber-pharmacist relationship. Furthermore, CWR has been employed successfully in the real-world to explore GP and pharmacist relationships in primary care (Rathbone et al., 2016) and to explore prescriber, pharmacist and nurse relationships in inpatient settings (Hakansson Lindqvist et al., 2019; Makowsky et al., 2009). Exploration of the prescriber, pharmacist and nurse relationship is germane to the research undertaken in this thesis noting Verrue et al.'s recommendation that future pharmacist interventions in RACFs focus on collaboration between these professional groups (Verrue et al., 2009). Thus, CWR was considered to be the best fit to frame the interprofessional collaboration aspects of this thesis.

2.5.3 Theory, models and frameworks – definitions

There has been increased interest in the use of theory, models and frameworks over the last two decades to help determine the mechanisms required for successful implementation of an intervention (Nilsen, 2015). A theory helps to explain why and how specific relationships between variables results in specific outcomes, informing how we understand and can explain our observations of the real-world (Nilsen, 2015). An example of a theory is Normalisation process theory (NPT) which is underpinned by four domains with the relationships between these domains influencing the extent to which a complex intervention can become part of routine practice (Murray et al., 2010). Further description of NPT is provided in section 2.5.4. Models support a more generalised understanding of these specific relationships, with frameworks often aiding in understanding implementation barriers and facilitators (Nilsen, 2015). Examples of a model and framework include the Stages of change model, which describes a process of behaviour change across five steps (precontemplation, contemplation, preparation, action, and maintenance) (Prochaska & DiClemente, 1982) and the Theoretical

domains framework, which assesses behaviour change (Nilsen, 2015) and identifies possible barriers and facilitators to implementing complex interventions (French et al., 2012).

As described in Part A (Chapter 1), medication management within RACFs is complex. Thus, the OSP intervention in real-world RACFs (within which this thesis was nested), is necessarily complex in its efforts to improve medication management within RACFs. While it has been suggested that researchers may be better served to rely on their own common sense, particularly for complex interventions (Bhattacharyya et al., 2006), theory can help evaluate complex interventions in health settings (Benson et al., 2018; Hughes et al., 2020; Nurjono et al., 2020). In fact, it can be difficult to understand why an intervention succeeded (or failed) and explain incongruent findings in the absence of established theory (Davidoff et al., 2015; Eccles et al., 2005; Nilsen, 2015). Furthermore, there is some evidence that theory-driven public health interventions have better outcomes when compared to those not informed or guided by theory (Glanz & Bishop, 2010). Thus, when evaluating complex interventions, or aspects of a complex intervention, the use of theory can be valuable.

2.5.4 Normalisation process theory

NPT was initially conceptualised from new technology implementation studies (May et al., 2007). It has since evolved into a 'mid-range' theory that offers a structure to understand how complex interventions can ultimately become embedded as part of usual practice (May et al., 2007). NPT has been employed in recent years in process evaluation, feasibility and implementation studies to evaluate complex health interventions (Huddlestone et al., 2020; Hughes et al., 2020; McEvoy et al., 2014; Segrott et al., 2017). According to NPT, for an intervention to be embedded into usual practice, at both the individual and collective level, four domains of work are required (coherence, cognitive participation, collective action, and reflective monitoring) (May et al., 2007). As illustrated in Table 1, its domains can be readily defined and measured. Consequently, this theory has often been employed to guide intervention evaluation (Nilsen, 2015).

Table 1: Definition of NPT domains (May et al., 2007)

NPT Construct	Brief definition
Coherence	How participants make sense of the intervention at the individual and team level and how people work together to operationalise the intervention
Cognitive participation	The engagement of participants to work together in operationalising the intervention
Collective action	The work that participants undertake to enact the intervention
Reflexive monitoring	The work that participants undertake to assess the intervention at the individual and team level

2.5.4.1 Rationale for using NPT

A number of theories, models and frameworks were considered as a key concept informing part of this thesis, but ultimately considered unsuitable. RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) (Glasgow et al., 1999) was not considered suitable as the outcome findings for the PiRACF study were investigated by another member of the PiRACF study team. Whilst the researcher recognised that all components of RE-AIM do not need to be assessed for all studies (Glasgow et al., 1999), the absence of effectiveness findings would have posed a significant limitation to this evaluation work. In stark contrast, NPT was considered highly suitable as all NPT domains were suitable for assessment within this thesis. In addition, using NPT could offer insights into this OSP intervention at the individual and collective level.

Furthermore, it is argued that NPT was appropriate for use in this thesis as it has been employed successfully in real-world RACF studies (Bond et al., 2020; Hughes et al., 2020; Richter et al., 2022). This is despite the possibility of qualitative data being able to be coded across multiple NPT constructs (Huddlestone et al., 2020). The researcher was aware of this challenge, and pro-actively addressed it through using framework analysis, which supported robust mapping of differentiated data. Overall, NPT was considered to be the best fit to help frame the evaluation guided by theory aspects of this thesis.

2.5.5 Implementation fidelity

Implementation fidelity describes extent to which an intervention was implemented as intended (Carroll et al., 2007). As a core component of process evaluation, assessing implementation fidelity helps researchers understand why and how an intervention worked (or did not work) (Craig et al., 2008; Durlak & DuPre, 2008). However, according to the current literature,

implementation fidelity is seldom reported (McMahon et al., 2015; Slaughter et al., 2015). Furthermore, a quality review identified that a measure of fidelity was only reported in 2.2% of the 45 included cluster randomised controlled trial articles (McMahon et al., 2015). While implementation fidelity is also sparsely assessed within the context of evaluated pharmacist interventions in RACFs (Batten et al., 2022), recent pharmacist intervention studies are beginning to redress this research gap in the RACF setting and beyond (Bond et al., 2020; En-Nasery-de Heer et al., 2022; van der Laan et al., 2019; Willeboordse et al., 2018).

This is promising given that, if implementation fidelity is not measured, it is unclear whether an intervention's lack of effect is due to poor implementation (i.e. implementation failure) or an inadequately designed intervention (i.e. theory failure) (van der Laan et al., 2019; Willeboordse et al., 2018). An additional benefit of measuring implementation fidelity is that it can support modifications and expanded adoption of interventions (Livet et al., 2020), as well as helping to explain why similar studies in different settings yield different findings (Carroll et al., 2007).

2.5.6 Hasson's conceptual framework for implementation fidelity

Carroll et al.'s conceptual framework for implementation fidelity defines implementation fidelity as consisting of two components – adherence and moderating factors (Carroll et al., 2007). Adherence measurements are generally quantifiable, specifically – content, coverage, duration and frequency and they measure the extent to which the intervention was implemented as expected (Carroll et al., 2007). Moderating factors might impact implementation fidelity and include participant responsiveness, intervention complexity, facilitation strategies, and quality of delivery (Carroll et al., 2007). Building upon Carroll et al.'s work (Carroll et al., 2007), Hasson proposed the inclusion of context and recruitment as two additional moderating factors (Hasson, 2010), as illustrated in Figure 8.

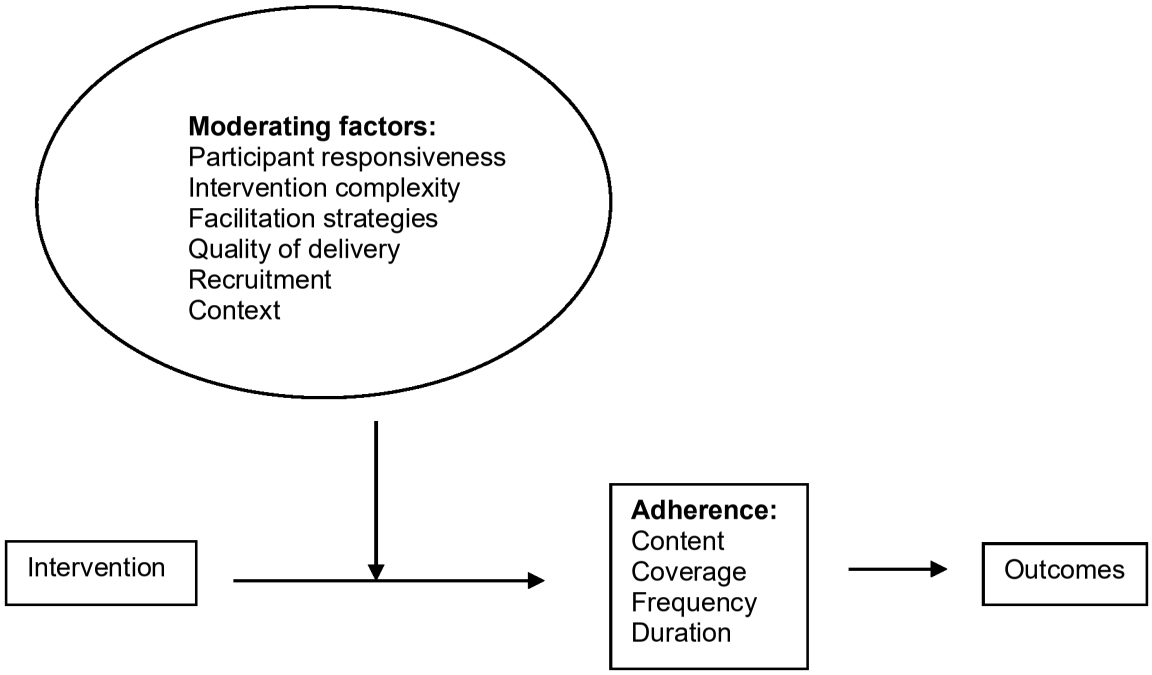


Figure 8: Hasson's conceptual framework for implementation fidelity (Hasson, 2010)

2.5.6.1 Rationale for using Hasson's conceptual framework for implementation fidelity

A number of implementation frameworks were considered prior to selecting Hasson's conceptual framework for implementation fidelity. Carroll et al.'s conceptual framework for implementation fidelity was initially considered; however it was developed based upon a critical review of existing theory and has not been fully tested in empirical studies (Carroll et al., 2007). Moullin et al.'s framework for the implementation of services in pharmacy was informed by qualitative interviews with pharmacists (Moullin et al., 2016). However, Moullin et al.'s framework was developed within the community pharmacy setting and focussed on delivery of professional community pharmacist services within this specific setting (Moullin et al., 2016). In comparison, Hasson's conceptual framework for implementation fidelity has previously been employed to assess implementation fidelity for a pharmacist intervention in the real-world (En-Nasery-de Heer et al., 2022). Furthermore, it is argued that using Hasson's conceptual framework for implementation fidelity was considered to be the best fit for this research given its anticipated transferability to the research setting of this thesis, an OSP intervention nested within the PiRACF study.

2.6 Ethical considerations

The Human Research Ethics Committee at University of Canberra (HREC-2007), ACT Health (2019/ETH13453) and Calvary Public Hospital Bruce (30-2019) approved the PiRACF study, inclusive of the mixed methods studies reported in Part B (Chapters 4-6).

Interview participants were provided with a participant information and consent form, and this form was signed by participants prior to commencing interviews. Written informed consent was also obtained from participants before surveys were commenced. Appendixes 1-9 outline relevant study documentation provided to the Human Research Ethics Committees.

For the purposes of confidentiality, participants interviewed were de-identified and labelled with an identifier reflective of their role and the facility they worked at or lived in, or where their family member lived. Only participants with capacity to consent were eligible to be interviewed. Residents and family members were provided a $20 gift card for their involvement. These gift cards were funded through the PiRACF study which received funding from the Australian Capital Territory's Primary Health Network (PHN) through the Australian Government's PHN Program. Data were stored on a password secured laptop, and all printed hard copies of data were disposed of in a locked confidentiality bin at the Health Research Institute, University of Canberra.

2.7 Chapter summary

This chapter described the methodology, methods and key concepts underpinning this thesis, as well as the justifications for these choices, which were consistent with the pragmatic approach taken for this thesis. A summary of each study's methodology, methods and key concepts are presented in Table 2, with the following chapters of this thesis providing further details.

Table 2: Summary of research design, methodology and methods

Study	Research questions	Methodology and methods	Key concepts
Study 1 (Chapter 3)	What was the breadth and depth of evaluation approaches, evaluation tools and aspects of implementation used in evaluated peer-reviewed pharmacist interventions in RACFs?	Scoping review according to Arksey and O'Malley's framework Four scientific databases searched for publications between 1 January 2000 and 27 August 2020, (n=54 articles included)	N/A
Study 2 (Chapter 4)	What was the extent of interprofessional collaboration between OSPs and prescribers, managers and nursing staff and what was the nature of these working relationships?	Embedded mixed methods study Semi-structured interviews Adapted surveys	Interprofessional collaboration McDonough and Doucette's conceptual model for the development of pharmacist-physician collaborative relationship (CWR)
Study 3 (Chapter 5)	What was the extent of OSP normalisation (i.e. OSPs becoming part of routine practice) and how were OSPs normalised?	Embedded mixed methods study Semi-structured interviews Adapted surveys	Theory, models and frameworks Normalisation process theory (NPT)
Study 4 (Chapter 6)	What was the implementation fidelity of OSP intervention delivery and what were the moderating factors influencing delivery?	Convergent parallel mixed methods study Semi-structured interviews Quantitative data sets: (1) range of OSP intervention activities delivered; (2) random sample of 10% of medication reviews assessed for quality; (3) proportion of residents who received at least one medication review	Implementation fidelity Hasson's conceptual framework for implementation fidelity

Part A
Setting the scene

Chapter 1
Introduction

Chapter 2
Methodology, methods and key concepts

Chapter 3
Manuscript 1: Evaluation approaches, tools and aspects of implementation used in pharmacist interventions in residential aged care facilities: A scoping review
https://doi.org/10.1016/j.sapharm.2022.05.006

Part B
Mixed methods studies

Chapter 4
Manuscript 2: Interprofessional collaboration between prescribers, managers, nursing staff and on-site pharmacists within Australian residential aged care facilities: A mixed methods study

Chapter 5
Manuscript 3: Exploration of an on-site pharmacist intervention within Australian residential aged care facilities using normalisation process theory: A mixed methods study

Chapter 6
Manuscript 4: Assessing implementation fidelity of an on-site pharmacist intervention within Australian residential aged care facilities: A mixed methods study

Part C
Discussion and future work

Chapter 7
Discussion and conclusion

Chapter 3
Manuscript 1: Evaluation approaches, tools and aspects of implementation used in pharmacist interventions in residential aged care facilities: A scoping review

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Declaration for Thesis Chapter 3

Declaration by candidate

In the case of Chapter 3, the nature and extent of my contribution to the work was the following:

Nature of Contribution	Extent of Contributions (%)
Miranda Batten was the lead author of the manuscript, designed the study, undertook data extract, quality appraised articles, undertook formal analysis and interpretation, displayed data, wrote and submitted the manuscript	80%

The following co-authors contributed to the work:

Name	Nature of Contribution	Contributor is also a UC student (Yes/No)
Sam Kosari	Research supervision, assisted with study design, undertook quality appraisal of articles, assisted in reviewing and editing the manuscript	N
Jane Koerner	Assisted in reviewing and editing the manuscript	N
Mark Naunton	Research supervision, assisted with study design, assisted in reviewing and editing the manuscript	N
Margaret Cargo	Research supervision, assisted with study design, assisted in reviewing and editing the manuscript	N

Candidate's Signature

11____/____5___/_____2022____

Date

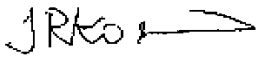
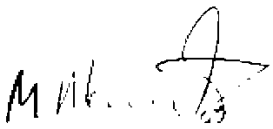
Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
(4) there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

[Please note that the location(s) must be institutional in nature, and should be indicated here as a department, centre or institute, with specific campus identification where relevant.]

Location(s):	Health Research Institute, University of Canberra Discipline of Pharmacy, Faculty of Health, University of Canberra

Signatures	Date
	11/5/2022
	11/5/2022
	11/5/2022
	11/5/2022

3.1 Introduction to manuscript

As described by Grant and Booth, there are 14 review types available and each comprises of its own distinct methodology and rationale for use (Grant & Booth, 2009). Scoping review is one such review type which has become a relatively common means of synthesising research knowledge (Colquhoun et al., 2014; Pham et al., 2014). Scoping reviews have been described as a review type in which a broad range of studies can be summarised and synthesised in a comprehensive manner (Arksey & O'Malley, 2005). The findings of scoping reviews can then be used to inform programs, policy and practice with research gaps identified guiding future research (Arksey & O'Malley, 2005; Peters et al., 2015).

The objective of this study was to systematically explore the breadth and depth of peer reviewed pharmacist interventions in RACF literature with a focus on evaluation approach, tools and aspects of implementation. The findings of this scoping review have informed the mixed methods studies reported in Part B (Chapters 4-6).

3.2 Publication

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Evaluation approaches, tools and aspects of implementation used in pharmacist interventions in residential aged care facilities: A scoping review

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ABSTRACT

Background: The medication expertise of pharmacists is widely acknowledged and there is ongoing interest in their potential role to reduce medication-related harm amongst residents living in residential aged care facilities (RACFs). An increased understanding of how these interventions are evaluated could support adoption of these interventions in the real world.

Objective: To systematically explore the application of evaluation approaches, evaluation tools and aspects of implementation (implementation factors i.e. barriers and facilitators, and assessing implementation fidelity) used in pharmacist intervention in RACF peer reviewed literature.

Methods: A search strategy was applied to MEDLINE, CINAHL, Cochrane Library and Web of Science databases for publications between 1 January 2000 and 27 August 2020 based on defined inclusion and exclusion criteria. Articles that reported on evaluated pharmacist interventions impacting residents in RACFs or which outlined study participant perspectives in relation to these interventions were included.

Results: 2003 published articles were identified, out of which 56 articles met the inclusion criteria. Fifty-three articles reported on outcome evaluations. Four articles used evaluation guidance with 1 article explicitly guided by an evaluation framework. Relationships, trust and respect between pharmacists and RACF health care team members were one of the most reported factors influencing intervention success. None of the 56 articles used a theory or model, assessed implementation fidelity or employed a logic model.

Conclusions: To date there appears to be sparse utilisation of available evaluation approaches, evaluation tools and implementation aspects in pharmacist intervention in RACF peer-reviewed literature. By embracing these evaluation approaches, evaluation tools and aspects of implementation, pharmacy practice researchers have an opportunity to contribute to evaluation research in RACFs and beyond.

1. Introduction

Reducing medication-related harm is an important health priority internationally.[1,2] Medication-related harm amongst patients is caused by inappropriate medication use, unsafe medication practices ranging from prescribing to dispensing and administration and medication errors.[3] It can also be caused by poor medication management at the healthcare system, facility and/or health professional level, such as poor transfer of information and infrequent review of resident's medications.[3] Residents living in residential aged care facilities (RACFs) are at high risk of medication-related harm. The term RACFs is used in this scoping review to encompass elderly residents living in nursing homes, care homes, long-term care facilities and residential aged care facilities. RACF residents often have multiple co-morbidities, are more likely to be frail, and to be prescribed several medications to manage their medical conditions.[4–6] Morin et al.'s systematic review concluded that internationally, inappropriate medication use affects almost 50% of residents living in RACFs.[7] In Australia, it has been found that around 17% of RACF residents have experienced an unplanned hospital admission due to inappropriate medication use.[8] The high healthcare cost arising from this inappropriate medication use amongst residents living in RACFs has also been established.[9,10] With increasing attention on improving the quality and safety of residents and the ongoing high demands on the healthcare system, there has been interest in the potential role of

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pharmacists to help reduce medication-related harm in RACFs given their medication expertise.[6,11–13]

1.1. Evaluation approaches

The peer-reviewed literature on pharmacist interventions in RACFs frequently focusses on evaluating outcomes, as outlined in a number of systematic reviews.[10,14–16] The focus of these interventions often aligns with those of an efficacy or effectiveness study where the aim is to determine whether the intervention worked in experimental or real world conditions.[17] The term 'complex intervention' is used in public health and health service literature.[10,18] A 'complex intervention' is generally described as an intervention with several components and may include characteristics relating to the behaviour required of those delivering and those receiving the intervention, organisational levels or groups targeted, variability of outcomes and degree of intervention tailoring or flexibility.[10,18] RACF medication management processes have been described as complex.[11] In turn, pharmacist interventions in RACFs are often complex interventions in that they typically comprise of multiple intervention strategies focussing on medication-related management activities which often involve other health care team members.[19] This can increase the complexity of the evaluation required.[20]

Even if a complex intervention was perceived a success as its intended outcomes were achieved, without a clear description of the intervention it can be difficult to fully understand what that intervention entailed.[20]

Process evaluation moves beyond the evaluation of outcomes and provides insight into the dynamics of implementation.[20,21] Process evaluation captures information on the different aspects of implementation including the contextual factors that shape implementation, as well as those that may act as barriers and/or facilitators to intended outcomes.[20] Findings of a process evaluation can identify why an intervention was successful or unsuccessful and thereby support potential transferability and adoption of interventions in other settings.[22] In the pharmacy practice research context, there is some evidence of the utilisation of this evaluation approach.[23,24] Although process evaluations can be featured as stand-alone research studies, they are often integrated with outcome evaluations and cost-effectiveness evaluations to provide increased confidence of the intervention findings.[20]

1.2. Evaluation tools

While a range of tools are available to assist with evaluating an intervention, for the purposes of this scoping review, three evaluation tools were considered. Namely the use of evaluation guidance; theory, models and frameworks; and logic models. The selection of these three evaluation tools was informed by the Medical Research Council's guidance on process evaluation of complex interventions.[17] Evaluation guidance is structured and supports researchers to design a robust evaluation of intervention outcomes.[25] Examples include the Medical Research Council's guidance on developing and evaluating complex interventions[10] and guidance on process evaluation of complex interventions.[17]

In contrast, theory, models and frameworks have been developed to be applied across a wide range of contexts and can aid researchers when thinking about evaluation design suitable for the phenomenon of interest.[26] Theory, models and frameworks differ in their level of abstraction and specification of relationships between variables.[26] Theories are the most explanatory and detailed, models may draw on a multitude of theories and frameworks, while frameworks are the most descriptive.[26] A detailed description of each of these terms with examples is provided in Table 1.

Logic models are a specific type of evaluation tool, now commonly used in health service evaluation.[25] A logic model is a visual representation of how intervention strategies relate to outcomes[13] and the concepts underlying the intervention's theory of change.[14,20] Logic models often integrate theory, model and framework concepts to help make explicit how an intervention will achieve its outcomes in its applied context. Logic models are commonly supported by a narrative specifying how the intervention will achieve its outcomes, and in what context.[10] There is some evidence that the use of these evaluation tools can support the development and implementation potential of complex interventions,[21] as well as intervention evaluation.

Table 1
Detailed description of theory, model and framework with examples.

Term	Description	Example
Theory	Theories explain how and why specific relationships between variables results in specific outcomes[26]	For example, the Normalisation Process Theory is underpinned by four determinants (coherence, cognitive participation, collective action and reflexive monitoring) and the relationships between these determinants influences the normalisation of complex interventions into day-to-day practice.[27] As its determinants can be readily measured, this theory has often been employed to evaluate interventions
Model	Models present more general relationships than theories on how an intervention is designed to work[26]	For example, the Stages of Change model describes a five-stage process of behaviour change (precontemplation, contemplation, preparation, action and maintenance)[28]
Framework	Frameworks tend to be useful for understanding barriers and facilitators to implementation or classifying outcomes at different levels (i.e. short, medium and long term)[26]	For example, the Theoretical Domains Framework was developed to assess behaviour change[29] and identifies a broad range of potential barriers and facilitators for complex interventions[30]

1.3. Aspects of implementation

In this scoping review, two key aspects of implementation were considered noting the Medical Research Council's guidance on process evaluation of complex interventions.[17] These aspects were chosen as they are key implementation components for complex interventions, and by extension, key implementation components for most pharmacist interventions in RACFs. The first aspect of implementation relates to identifying contextual factors, which can include barriers and facilitators. Identification of barriers and facilitators is particularly important for complex interventions as they can potentially modify the impact of intervention activities undertaken.[17] In keeping with Garcia-Cardenas et al.'s pharmacy research terminology, the term 'implementation factor' was used for this scoping review.[31] An implementation factor may comprise of a positive moderating element i.e. a 'facilitator' or a negative moderating element i.e. a 'barrier'.[31]

The second aspect of implementation which this scoping review considered was implementation fidelity. Depending on its definition, implementation fidelity is sometimes viewed as a core component of process evaluation.[20] For the purposes of this scoping review, Carroll's comprehensive definition of implementation fidelity was applied.[32] A detailed description of Carroll's conceptual framework of implementation fidelity is provided in Table 2. Assessment of implementation fidelity helps to establishes whether the intervention's lack of effect is due to poor adherence or implementation (i.e. implementation failure) or an inadequately designed intervention (i.e. theory failure).[33,34] Without assessing implementation fidelity it is difficult to know what was implemented and how to interpret intervention findings.

The potential benefits of utilising dissemination, implementation and improvement science are often highlighted in pharmacy practice research.[23,24,35] Implementation studies are undertaken to determine

Table 2
Detailed description of Carroll's conceptual framework of implementation fidelity.

Term	Description
Carroll's conceptual framework of implementation fidelity	Carroll's comprehensive definition of implementation fidelity requires the measurement of intervention adherence, exposure, delivery quality, responsiveness of participants and intervention differentiation.[36] Intervention adherence pertains to the content and flow of the intervention. Exposure aims to capture the intervention dose delivered or the dose received. Delivery quality relates to the appropriateness of the delivery process. Participant responsiveness pertains to the individual delivering and individual receiving the intervention. Intervention differentiation focuses on determining the "essential" elements of the intervention.[36,37]

the extent to which implementation of the intervention is embedded in certain settings.[11] By contrast, limited attention has been paid to how pharmacist interventions are evaluated for their efficacy or effectiveness. In particular, the extent and range of evaluation approaches, evaluation tools and implementation aspects used to help evaluate pharmacist interventions in RACFs is not currently known. As described by Moore et al., quality evaluation is essential to support the dissemination, adoption and sustainability of evidence-based interventions in the real world.[34] The use of evaluation guidance, theory, models and frameworks, logic models, identifying implementation factors and systematically assessing implementation fidelity contribute to the design of a quality evidence-based evaluation. These approaches, tools and aspects have been used in health service evaluation for decades to unpick and understand how interventions operate to achieve their intended outcomes.[35]

The aim of this scoping review was to systematically explore the peer-reviewed literature to better understand the evaluation approaches, evaluation tools and implementation aspects employed in pharmacist interventions in RACFs. This scoping review focussed on identifying 1) the evaluation approaches used; 2) the application of three evaluation tools, namely the use of evaluation guidance, theory, models and frameworks; and logic models; and 3) whether implementation factors and assessment of implementation fidelity was mentioned.

2. Methods

Scoping reviews map the research within an area of literature, summarise findings, identify research gaps and may make recommendations.[32] This scoping review was guided by Arksey and O'Malley's 5-stage framework which includes the following steps: (1) identify the research question; (2) identify relevant studies to address the research question; (3) select studies; (4) chart the data; and (5) collate, summarise and report the results.[32] In undertaking this scoping review, a number of Levac et al.'s suggested enhancements[33] to Arksey and O'Malley's 5-stage framework[32] were employed. This included, clarifying the research question and scoping review focus and purpose, engaging study team members with the necessary methodological and content knowledge to undertake the review, acknowledging study limitations, team discussions around inclusion and exclusion criteria, pilot testing the data extraction spreadsheet, considering review findings and then providing concrete recommendations for future research and practice.[33] The scoping review type was chosen due to its suitability to identify a broad range of studies in a transparent and systematic way.[31,32] This scoping review is reported using the PRISMA Extension for Scoping Reviews.[32]

2.1. Research question and search strategy

This scoping review explored the question, *'What evaluation approaches, tools and aspects of implementation have been used in peer-reviewed pharmacist interventions in RACFs?'* A comprehensive search was performed in MEDLINE, CINAHL, Scopus, Cochrane Library and Web of Science databases to identify studies published from 1 January 2000 to 27 August 2020. This timeframe was pragmatically chosen noting that the Medical Research Council guidance for the development of complex interventions was initially published in 2000. Published articles were searched using four search strings combining the following key words: intervention, residential aged care home, pharmacy and effect; as well as using five search strings combining the following key words: intervention, residential aged care home, pharmacy, effect and qualitative. These search strings were combined using the Boolean operator of AND or OR where appropriate, as described in Appendix A.

Additional articles were included using a 'snowballing' approach through manual searching of references cited in retrieved articles[38] and systematic reviews relevant to the research topic.[7,14,39,40] Original papers of interest relating to a relevant article were also screened for inclusion as a sibling paper.[32] The inclusion of sibling papers supports a broader understanding of the intervention's context and factors that might have influenced its impact.[38]

2.2. Study selection – inclusion and exclusion criteria

All search results were imported into Covidence, a web-based software platform[41], and screened according to the specified inclusion and exclusion criteria. Peer-reviewed articles were included if: 1) there was a description of pharmacist involvement as part of an intervention strategy; 2) the intervention impacted RACF residents or included study participant perspectives in relation to a pharmacist intervention in RACF; and 3) the article was written in English. Articles were excluded if: 1) the article had no reference to pharmacist involvement; 2) the article was not written in English; and 3) the article was published as a study protocol, conference abstract, systematic review, narrative review or summary paper.

The inclusion and exclusion criteria were refined *post hoc* to more explicitly focus on the evaluation component of the scoping review question, by which only articles evaluating findings relating to pharmacist interventions in RACFs were included. This approach was consistent with Arksey and O'Malley's scoping review framework[32] and it has been suggested by some that this *post hoc* criteria development is an important feature of a scoping review.[40,42]

Two reviewers (MB and SK) applied the specified inclusion and exclusion criteria independently to 10% of all search results for this review. That is, at both the title and abstract screening, and full text screening stages. After independent review of 10% of the search results, inter-rater reliability was assessed. After consensus was reached at each screening stage, one reviewer (MB) screened the remaining 90% of articles as per Di Salvo et al.'s approach.[43] In the event of any disagreement between the two reviewers, a third reviewer (MN) was available to decide on the outcome.

2.3. Data extraction and synthesis

Data were extracted from eligible articles using a data extraction form developed in Microsoft Excel. Two reviewers (MB and SK) independently pilot tested the data extraction spreadsheet as per Levac et al.'s suggestion.[33] One reviewer (MB) then independently extracted data from all eligible articles, informed by Arksey and O'Malley's scoping review framework[32] data were extracted across the four domains described in Table 3.

Data were analysed using a narrative synthesis approach given the anticipated heterogeneity of study designs included in this scoping review.[38] Gaps in the literature were identified during the collation and

Table 3
Data extracted from included articles across four domains.

Domain	Data extraction
1. Descriptive study characteristics	Descriptive characteristics of the articles, specifically author, year, study location, study period, study type, study methodology, study population and setting, intervention strategies, details of pharmacist(s) involved in intervention, additional training/education provided to pharmacists as part of intervention, details of intervention undertaken by pharmacist(s), terminology used to describe pharmacist and health care team member interaction, resident perspective considered in study findings, intervention type i.e. multi-faceted or single, study findings Appendix B key data includes descriptive characteristics of the studies included by the Template for Intervention Description and Replication (TIDieR) checklist.[53] This checklist was selected based upon Hoffmann et al.'s[54] recommendation that the TIDieR checklist be used when assessing efficacy and effectiveness studies
2. Evaluation approach	Evaluation approach used i.e. outcome only, process only, outcome and process, cost-effectiveness
3. Evaluation tools	Evaluation tools used, namely evaluation guidance, theory, models and frameworks, logic models
4. Implementation barriers	Whether implementation fidelity was assessed as per Carroll's definition[55] and implementation barriers identified in the articles Appendix C key data includes intervention type, evaluation approaches, tools and assessment of implementation fidelity With respect to implementation factors, data were extracted from descriptive information provided in the results and discussion sections of the included articles. Extracted implementation factor data were coded based upon Jorgenson et al.'s findings relating to pharmacist integration into primary health care team facilitators and barriers e.g. value of the pharmacist role, relationships, trust and respect[56] and supplemented with inductively generated codes. There is no accepted taxonomy for describing implementation factors for studies in this setting. As such, the implementation factors for this study were initially identified based upon Jorgenson et al.'s categorisations[56] given the potential alignment of pharmacist interventions undertaken in primary care and within RACFs. This initial coding framework was supplemented using a taxonomy derived from inductive coding which identified additional categories. Appendix D provides the implementation factor taxonomy used for this scoping review.

reporting of results processes.

2.4. Quality assessment

The eligible articles were quality appraised as per Daudt et al.'s recommended addition to Arksey and O'Malley's scoping review framework.[50] Given the absence of a 'gold standard' quality appraisal tool, the Mixed Methods Appraisal Tool (MMAT)[49] was used for this scoping review due to its content validity and given its ability to be used across different study designs.[49] Two reviewers (ME and SK) assessed the quality of eligible articles against the 5-item quality criterion for each study design. Articles were assigned an overall quality rating from 0% (extremely low) to 100% (very high). Consensus on quality scores was achieved through discussion between the two reviewers.[50] All articles were reported on irrespective of their quality given their potential contribution to understanding this area of research.[51]

3. Results

3.1. Search results

The search retrieved a total of 2003 articles; 1969 were identified through database searching and 34 were identified through other sources i.e. manual searching of references cited in retrieved articles and relevant systematic reviews. After removing duplicates and assessing retrieved articles against the inclusion and exclusion criteria, 56 full-text articles were included in the review. Of these, 5 were sibling papers. The article selection process is presented in Fig. 1.

3.2. Title and abstract, and full text article screening

For the title and abstract screen inter-rater reliability assessment, before consensus was reached between the two reviewers, a value of 0.967 for Cohen's Kappa was achieved with a value between 0.81 and 0.90 considered consistent with 'near perfect' agreement.[52] A value of 1.00 for Cohen's Kappa, 'perfect' agreement,[52] was achieved between the two reviewers for 10% of retrieved articles for the full text screen.

3.3. Characteristics and summary of results

A summary of key characteristics is presented in Table 4 below.

As shown in Table 4, most articles (n = 15)[57,72–80] were published in Europe (excluding the United Kingdom & Scandinavia), followed by publications in the United Kingdom (n = 9),[57,81–88] United States (n = 8)[89–96] and Australia (n = 8).[97,98,110] Fifty-three articles reported quantitative findings, with a range of quantitative study designs employed from pre-post studies (n = 25)[57,72,73,75,77,78,80,82,83,85–88,90–96,98,100,101,103] to Cluster Randomised Controlled Trials (RCTs) (n = 10)[74,76,79,81,84,89,99,102,104,105] and RCTs (n = 7).[97,106,107,109,111,112] Five of the articles which reported quantitative findings mentioned incidental qualitative findings.[80,100,105,115] Of the included 56 articles, only 3 utilised mixed methods[75,108,110] and none reported on qualitative only studies. Fourteen articles were published between 2000 and 2008.

Most of the included articles, (n = 39), described multi-faceted interventions[57,72,73,75,76,78,80,82,84,85,87,88,90–95,97,98,100–104,106–113,115,117,119,121–123,125] consisting of a minimum of two intervention types.[126] For example, an article which described an intervention in which a pharmacist conducted medication reviews, educational meetings, and communicated with RACF staff on medication management issues was categorised as a multi-faceted intervention.[126]

The most common intervention strategy employed was medication reviews, with 19 of the included articles (34%) reporting on prescriber acceptance rates for medication reviews.[74,76,80,82,84,85,87,88,90–92,94,95,97,98,102,103,110,119,120,124,125] The 19 articles reported prescriber acceptance rates of medication review recommendations as ranging from 6% to 98% with a median of 70.5%. For the article with the lowest rate of prescriber acceptance, 6%, the study authors proposed a few contributing factors including limited interactions between prescribers, pharmacists and RACF staff participating in the intervention.[110] For the highest prescriber acceptance rate (98%), study authors highlighted the contribution of the close working relationship between prescribers and pharmacists during the intervention.[84]

3.4. Evaluation approaches and tools used

Most articles evaluated outcomes only (n = 53). Two articles evaluated cost-effectiveness,[89,94] 1 article evaluated processes only[97] and 1 article evaluated process and outcomes.[84] Four articles used evaluation guidance. Three articles reported use of the Medical Research Council guidance on developing and evaluating complex interventions[76,81,98] and 1 article used the Medical Research Council guidance on process evaluation of complex interventions.[97]

None of the 56 articles used theory when evaluating the implementation of pharmacist interventions in RACFs. Only 1 article mentioned use of an evaluation framework.[110] This article utilised the Theoretical Domains Framework.[70] None of the articles were guided by a model and none described the use of a logic model.

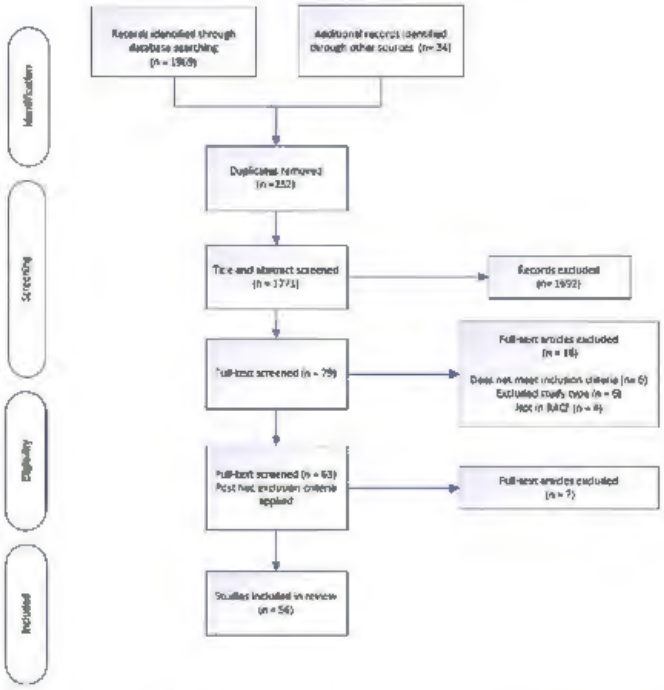

Fig. 1. Flowchart of the article selection process.

Table 4
Summary of characteristics.

Study location	n	%
Europe (excluding United Kingdom & Scandinavia)	15	27
United Kingdom	9	16
United States	8	14
Australia	8	14
Scandinavia	7	12
Canada	6	11
New Zealand	2	4
Singapore	1	2
Methodology	N	%
Quantitative	53	95
Mixed methods	3	5
Quantitative study design (n=53)	N	%
Pre-post studies	25	47
Cluster Randomised Controlled Trials	10	19
RCTs	7	13
Non-randomised controlled trials	5	10
Other	6	11
Intervention type	N	%
Multi-faceted	39	70
Single-faceted	17	30

3.5. Implementation factors

Each article's perceived implementation factors were coded based upon the taxonomy informed by Jorgenson et al.'s findings[95] and additional categories generated inductively. The most commonly reported facilitators included perceived positive value of the pharmacist role (n = 12),[22,27,74,76,84,85,87,92,93,96,104,126] existence of relationships, trust and respect (n = 9),[27,81,84,93,108,111,112,114,116] intervention characteristics such as resident involvement, prior RACF exposure to this intervention strategy, focus on specific medication issues, intervention strategies used, positive perception of intervention methods or aspects, intervention audience targeted (n = 8)[22,73,87,96,98,104,110,121] and collaboration amongst health care team members (n = 7).[75,87,105,112,113,120,123] The most common reported barriers included external factors such as intervention impact on health care team member time, time available for GP involvement, other related programs introduced which were potential confounding factors, resources and funding (n = 12),[22,74,92,96,100,104,106,108,113,113,118,125] organisational factors such as RACF staff knowledge and skills, staff turnover rates, key stakeholders on leave, workload demands, information available to visiting pharmacists, culture of the organisation, orientation and support (n = 11),[27,74,78,82,83,92,104,113–115,118] intervention characteristics (n = 9),[83,84,99,100,104,113,118,124,125] absence of resident or health care team member buy in (n = 8),[27,82,86,87,92,96,106,110] indirect communication method used (n = 7)[91,92,95,96,108,115,124] and absence of relationships, trust and respect (n = 6).[92,96,97,99,99,114] Appendix B provides a table of the implementation factors coded in this scoping review. Although relationships, trust and respect and collaboration amongst health care team members were commonly reported implementation factors, none of the included 56 articles appeared to conceptualise, measure or explore the interaction amongst RACF health care team members or between pharmacists and RACF health care team members. The articles used varying terms when describing these interactions. Seventeen articles used the term 'multidisciplinary'[22,27,74,75,77,79,81,84,85,87,88,106,108,115,117,119,122] with

other articles using the term 'interdisciplinary' (n = 6), 'collaboration' (n = 5), 'interprofessional' (n = 2) or 'multi-speciality' (n = 1).

3.6. Implementation fidelity

None of the 56 articles assessed the implementation fidelity of an evaluated intervention as per Carroll's definition.[46] A small number of articles (n = 6) made some reference to adherence to the protocol and assessment of pharmacist generated documentation for appropriateness.

3.7. Quality assessment of included studies

Articles reporting on quantitative non-randomised studies were predominantly scored as low quality (n = 22) and an average quality score was found for articles reporting on quantitative RCT studies (n = 10) (see Table 5).

4. Discussion

The articles included in this scoping review were predominantly multi-faceted pharmacist interventions in RACFs with the aim of reducing medication-related harm. In all 56 included articles, there was negligible use of evaluation guidance and evaluation frameworks, with no reference to theory or models, assessment of implementation fidelity or use of logic models. Intervention characteristics, external factors and relationships, trust and respect between pharmacists and RACF health care team members were identified as the most commonly reported implementation factors. To our knowledge, this is the first scoping review to focus on the application of evaluation approaches, evaluation tools and aspects of implementation in relation to pharmacist interventions in RACFs.

4.1. Evaluation approaches

This review reaffirms previous findings that pharmacist interventions in RACFs are usually multi-faceted and predominantly focus on evaluating outcomes. Despite the volume of evaluated pharmacist interventions in RACFs, there has been limited exploration of the evaluation approaches, evaluation tools and aspects of implementation employed in these studies. No systematic reviews considering implementation and evaluation approaches in relation to this research area were identified. Only two systematic reviews were identified which considered implementation and evaluation approaches in relation to community pharmacy service interventions. Evaluating the outcome of an intervention is an important step in developing the evidence-base for an intervention.[44] However, to support the adoption of these interventions, it is necessary to also evaluate processes associated with the intervention's implementation which can in turn, influence the intervention's effectiveness.[47] Additionally, given increasing healthcare costs and the sparse assessment of cost-effectiveness for pharmacist interventions in RACFs,[13] increased attention on medication and related cost savings might be beneficial as well. It is recommended that pharmacy practice researchers take the time to contemplate which evaluation approach (or combination of approaches) will best suit their research study.

4.2. Evaluation tools

The use of evaluation guidance has previously been advocated by Rankin et al. in their systematic review of interventions seeking to improve polypharmacy in older people.[19] Consistent with Rankin et al.'s finding,[19] this review identified that evaluation guidance is seldom employed (n = 4) in pharmacist interventions in RACFs. Given the limited use of evaluation guidance, at a minimum, it is recommended that pharmacy practice researchers use reporting guidelines as described by Flemming et al.[21] as an additional means of facilitating increased consistency and quality of reporting of pharmacist interventions in RACFs. We recommend that journal editors require all empirical studies to be reported against using an appropriate reporting or evaluation guideline.

It has been suggested that researchers may be better served to rely on their own common sense, particularly for complex interventions,[101] instead of using theory. However, evaluation evidence shows that public health interventions guided by theory are more likely to demonstrate positive outcomes than interventions not informed by theory.[102] This review found no mention of theory to aid the evaluation of pharmacist interventions in RACFs. To improve understanding of evaluation theory, we strongly advocate that papers report on how evaluation theory can be practically applied to the real world. Leurcis et al.'s[103] recent paper on realist evaluation provides an excellent exemplar for this. Coupled with this, also we recommend that pharmacy practice journal editors regularly facilitate evaluation research special editions to increase pharmacy practice researcher familiarity with respect to evaluation research.

Promisingly, a recent process evaluation study protocol for the Care Home Independent Prescribing Pharmacist Study (CHIPPS) described the utilisation of the Normalisation Process Theory,[75] specifically the use of the validated 23-item Normalisation Measurement Development survey.[104] Likewise, although this review found no mention of logic models employed in pharmacist interventions in RACFs, it is worthwhile to note that the CHIPPS process evaluation study protocol included a logic model as supplementary information.[75] For future studies, with the

Table 5
Summary of study design and MMAT scores using format adapted from Scott et al.[45]

Study design	MMAT score distribution[a]					
	0% (extremely low quality)	20% (very low quality)	40% (low quality)	60% (average quality)	80% (high quality)	100% (very high quality)
Mixed methods[b]		1			2	
Qualitative			1		1	1
Quantitative descriptive	1		1			1
Quantitative non-randomised	3	4	22	7		
Quantitative RCT[c]	1	2	4	10		
Total	5	7	28	17	3	2

Footnote.
[a] MMAT definitions: quantitative non-randomised studies – non-randomised controlled trials, cohort study, case-control study, cross-sectional analytic study; quantitative descriptive – incidence or prevalence study without comparison group, survey, case services, case report.
[b] For mixed methods studies, the qualitative, quantitative and mixed methods components were assessed and have been presented separately resulting in a total number of 62.
[c] Quantitative RCT includes individual RCTs and cluster RCTs.

understanding that pharmacist interventions in RACFs are often complex, it would be beneficial for pharmacy practice researchers to consider collaborating with evaluation researchers to optimise the use of available evaluation tools, such as evaluation guidance, theory, models and frameworks and logic models, where appropriate.

4.3. Implementation factors

Pharmacist interventions in RACFs may be enhanced or hindered by a range of implementation factors ranging from external and organisational factors through to the characteristics of the intervention itself and the relationships between pharmacists and RACF health care team members. Application of the TIDieR checklist[93] when designing interventions could potentially foster increased consideration of two of the most commonly reported implementation factors reported in this scoping review, namely intervention characteristics and external factors. The TIDieR checklist[93] is ideally suited for clearly describing an intervention as well as identifying potential elements (associated with the intervention itself or externally) which may enable or impede the intervention's success. Relationships, trust and respect were also identified as one of the most commonly reported barriers or facilitators for pharmacist interventions in RACFs. For the purposes of this scoping review, the term interprofessional collaboration was used as the overarching term to describe the development and maintenance of relationships, trust and respect, that is *'the process in which different professional groups work together to positively impact health care'*.[135] Effective pharmacist and prescriber interprofessional collaboration is a key success factor for pharmacist interventions in primary care.[136] Increased interprofessional collaboration between pharmacists and prescribers yields higher prescriber acceptance of pharmacist recommendations.[137] A prescriber is more likely to accept evidenced based recommendations from a pharmacist if the prescriber trusts the medication expertise of pharmacists and has had regular face-to-face interactions with pharmacists in the past.[138] This is highly relevant to pharmacist interventions in RACFs wherein medication reviews are the most common intervention strategy employed,[15,16] consistent with the findings of this scoping review. The use of interprofessional collaboration alongside intervention strategies such as medication review has been identified as a potential strategy to reduce medication related harm for older people.[139] Verrue et al. and Lee et al.'s systematic reviews identified that collaboration within the pharmacist intervention in RACF research area was *underexplored*.[17,18] Further research on interprofessional collaboration is important given the expanding role of allied health professionals, including pharmacists, in RACFs.[140] In addition, we also strongly encourage other pharmacy practice researchers to continually refine the implementation factor taxonomy developed as part of this study.

4.4. Implementation fidelity

Assessing implementation fidelity helps researchers and decision makers understand why and how an intervention's implementation worked (or did not work).[20,141,142] Although the evaluation of complex interventions benefits from measurement of implementation fidelity, this review found that adherence to protocol were rarely mentioned in most evaluations (n = 7) with no articles assessing implementation fidelity. This finding is consistent with the broader literature[143,144] and within pharmacy practice research.[145,146] The low to average quality of the quantitative studies included in this review is mostly attributed to their published articles not providing adequate detail on specific MMAT domains – confounders, outcome assessor blinding and especially with regards to intervention adherence or implementation fidelity assessment. Consistent use of the TIDieR checklist[93] when describing evaluated pharmacist interventions in RACFs would act as a valuable nudge for pharmacy practice researchers to further consider the potential benefit of assessing the intervention's implementation fidelity. Pharmacy practice researchers could also consider the benefits of assessing implementation fidelity using both quantitative and qualitative data[42,147–149] underpinned by an existing implementation fidelity framework.[42] For example, a recent study protocol for the Pharmacists Integrated into Residential Aged Care Facilities study describes the planned assessment of fidelity using mixed methods data informed by an existing framework.[150] Measuring implementation fidelity helps to facilitate the adoption of interventions by identifying the conditions required for successful implementation.[151]

While application of these evaluation approaches, evaluation tools and aspects of implementation may not be suitable for all pharmacist interventions in RACFs, their judicious incorporation could help strengthen the evaluation quality of future pharmacist interventions in RACFs and thus increase the likelihood of intervention success and adoption in other RACF settings.

4.5. Strengths and limitations

This review provides a novel contribution to the peer reviewed literature as it explores the evaluation approaches, as well as specific evaluation tools and aspects of implementation utilised within this research area. The use of a scoping review approach allowed inclusion and examination of heterogenous study designs not previously reported. Limitations of this review relate to the key search terms and their combination, the limited number of databases searched and that the grey literature was not searched as a pragmatic approach was taken to balance the range of included literature with the time and resources available.[54] A further limitation was the possibility of labelling some evaluation approaches, intervention strategies and coding some implementation factors differently to study authors' intentions

5. Conclusion

This scoping review describes pharmacist intervention in RACF peer reviewed literature wherein there is limited utilisation of available evaluation approaches, evaluation tools and implementation aspects. Future pharmacist intervention in RACF studies may benefit from being informed by varying evaluation approaches, evaluation tools, namely the use of evaluation guidance; theory, models and frameworks; and logic models, as well as consideration of implementation aspects, such as assessment of implementation fidelity. Interprofessional collaboration between pharmacists and RACF health care team members emerged as one of the most common implementation factors with the potential to positively (or negatively) influence implementation of pharmacist interventions in RACFs and requires further research. An opportunity exists for pharmacy practice researchers to leverage available evaluation approaches, evaluation tools and aspects of implementation to improve the evaluation quality of their interventions and thereby support adoption of pharmacist interventions in RACFs.

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Miranda Batten: study design and concept, data extraction, quality appraisal of articles, formal analysis, interpretation, data display, writing – original draft, writing – review and editing, revision and approval of final manuscript. **Sam Kosari**: study design and concept, quality appraisal of articles, data curation, writing – review and editing, revision and approval of final manuscript. **Jane Koerner**: writing – review and editing, revision and approval of final manuscript. **Mark Naunton**: study design and concept, writing – review and editing, revision and approval of final manuscript. **Margaret Cargo**: study

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Declaration of competing interest

None to declare.

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Appendix A. Supplementary data

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Additional File A. Search terms

Additional File B. Key data extracted - descriptive characteristics of studies

Additional File C. Key data extracted - intervention type, evaluation approach, evaluation tools and assessment of implementation fidelity

Additional File D. Implementation factor taxonomy

Additional File E. Implementation factor table

Additional file A Search terms

Search databases	Search strings
MEDLINE	(intervention OR integrat* OR embed OR emerg* OR new roles AND aged care OR nursing homes OR residential aged care facilities OR long term care facilities or facili* OR care home AND Pharm* OR pharmacy OR pharmacy services AND effect* OR impact or effectiveness OR feasib* OR outcome OR barrier OR facilitator or enable* OR implement* OR evaluation OR evaluat* OR evaluation study) (intervention OR integrat* OR embed OR emerg* OR new roles AND aged care OR nursing homes OR residential aged care facilities OR long term care facilities or facili* OR care home AND Pharm* OR pharmacy OR pharmacy services AND effect* OR impact or effectiveness OR feasib* OR outcome OR barrier OR facilitator or enable* OR implement* OR evaluation OR evaluat* OR evaluation study AND qualitative or focus group or interview)
CINAHL	(intervention OR integrat* OR embed OR emerg* OR new roles AND aged care OR nursing homes OR residential aged care facilities OR long term care facilities or facili* OR care home AND Pharm* OR pharmacy OR pharmacy services AND effect* OR impact or effectiveness OR feasib* OR outcome OR barrier OR facilitator or enable* OR implement* OR evaluation OR evaluat* OR evaluation study) (intervention OR integrat* OR embed OR emerg* OR new roles AND aged care OR nursing homes OR residential aged care facilities OR long term care facilities or facili* OR care home AND Pharm* OR pharmacy OR pharmacy services AND effect* OR impact or effectiveness OR feasib* OR outcome OR barrier OR facilitator or enable* OR implement* OR evaluation OR evaluat* OR evaluation study AND qualitative OR focus group OR interview)
Scopus	(intervention OR integrat* OR embed OR emerg* OR new roles AND aged care OR nursing homes OR residential aged care facilities OR long term care facilities or facili* OR care home AND Pharm* OR pharmacy OR pharmacy services AND effect* OR impact or effectiveness OR feasib* OR outcome OR barrier OR facilitator or enable* OR implement* OR evaluation OR evaluat* OR evaluation study) (intervention OR integrat* OR embed OR emerg* OR new roles AND aged care OR nursing homes OR residential aged care facilities OR long term care facilities or facili* OR care home AND Pharm* OR pharmacy OR pharmacy services AND effect* OR impact or effectiveness OR feasib* OR outcome OR barrier OR facilitator or enable* OR implement* OR evaluation OR evaluat* OR evaluation study AND qualitative OR focus group OR interview)
Cochrane Library	(Aged care AND pharmacist AND intervention AND effect) (Aged care AND pharmacist AND intervention AND effect AND qualitative)
Web of Science	(intervention OR integrat* OR embed OR emerg* OR new roles AND aged care OR nursing homes OR residential aged care facilities OR long term care facilities or facili* OR care home AND Pharm* OR pharmacy OR pharmacy services AND effect* OR impact or effectiveness OR feasib* OR outcome OR barrier OR facilitator or enable* OR implement* OR evaluation OR evaluat* OR evaluation study) (intervention OR integrat* OR embed OR emerg* OR new roles AND aged care OR nursing homes OR residential aged care facilities OR long term care facilities or facili* OR care home AND Pharm* OR pharmacy OR pharmacy services AND effect* OR impact or effectiveness OR feasib* OR outcome OR barrier OR facilitator or enable* OR implement* OR evaluation OR evaluat* OR evaluation study AND qualitative OR focus group OR interview)

Additional file B Key data extracted - descriptive characteristics of studies

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
Alldred, 2007 sibling study	United Kingdom	Not reported	315 residents, 65 care homes	To assess the impact of a pharmacist medication review on medication problem identification	Medication review	A pharmacist undertook one medication review for eligible residents, this included reviewing resident records at the resident's general practice (20 - 30 minutes per resident) The pharmacist then attended the resident's care home and reviewed resident records there as well. Where possible, the pharmacist spoke with the resident and obtained their agreement on proposed medication changes (or tests). The pharmacist also spoke with care home staff about the resident The pharmacist provided written recommendations to the GP The total number, duration and frequency of general practice and care home visits; and time taken to provide recommendations was not mentioned	Held a clinical pharmacy postgraduate qualification Hospital background
Anrys, 2019 sibling study to Strauven, 2019	Belgium	12 months	Intervention group: 847 residents, 24 nursing homes Control group: 957 residents, 30 nursing homes 129 health care professionals (48%) from 24 intervention	To assess the implementation and participant perspectives of a multifaceted complex intervention seeking to improve prescribing appropriateness (COME-ON study)	Inter-professional education Multidisciplinary case conference (general practitioner, pharmacist and nurse) inclusive of medication review Local interdisciplinary meetings	A pharmacist and/or a physician provided staff education to nurses on drug administration and recognising adverse drug events Local interdisciplinary meetings consisting of pharmacists, physicians and nurses were held to discuss use of a single medication class 46 local interdisciplinary meetings were held in total Interdisciplinary case conferences (ICCs) consisting of a pharmacist, physician and nurse(s) were held and included resident medication reviews	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			nursing homes completed a satisfaction survey 11 intervention nursing homes participated in the multidisciplinary focus groups comprising of physicians, pharmacists and nurses	For noting: this study was included in this scoping review due to its participant insights relating to the COME-ON study		ICCs usually took a median of 15 minutes, each resident had a median of 3 ICCs, ICCs were held every 4 months with a total 1675 ICCs held across all nursing homes The total number and duration of pharmacist delivered (or co-delivered) education sessions was not mentioned	
Bach, 2017	United States	7 months	Nursing Home 1: 14 residents Nursing Home 2: 6 residents 2 (29%) prescribers completed feedback questionnaires	To assess the impact of using a pharmacist initiated antipsychotic tool on the appropriateness of antipsychotics used for residents with dementia	Antipsychotic use review	A consultant pharmacist reviewed resident records of eligible residents with dementia who were prescribed antipsychotic medications, including liaising with nursing staff in relation to resident behaviour and care provided Pharmacist recommendations provided to prescribers The time taken to undertake record reviews and provide recommendations was not mentioned	Consultant
Balsom, 2020	Canada	12 months	45 residents, 1 long-term care facility Intervention	To assess the impact of a pharmacist intervention with a	Medication review with follow up education meetings	A pharmacy student provided an education session to nursing and support staff on deprescribing and polypharmacy before the study commenced A pharmacy student under the supervision of a	Student Consultant

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			group: 22 residents Control group: 23 residents	focus on deprescribing		consultant pharmacist undertook a medication review for eligible residents. This included communicating with the resident, family, nursing staff and physician The pharmacist then developed a deprescribing and monitoring plan for the residents which was discussed with the resident, family, nursing staff and the physician (when attending rounds) Prior to any medication changes a pharmacist or pharmacy student provided education to the resident, family, nursing staff and physician A pharmacist or pharmacy student followed up residents post-deprescribing on a weekly basis and could provide input at the nursing home every weekday The total number and duration of staff education sessions, the number of who attended, time taken to complete medication reviews and develop a plan, and provide related education and follow up was not mentioned	
Baqir, 2014	United Kingdom	12 months	422 residents, 20 care homes It was incidentally mentioned that qualitative interviews were conducted with	To assess the impact of multidisciplinary medication reviews with a focus on resident, family member and carer involvement	Medication review - pharmacist-led followed by multidisciplinary meeting (pharmacist, GP, care home nurse, other	A pharmacist undertook one medication review for eligible residents A multidisciplinary team (MDT) consisting of a clinical pharmacist, care home nurse and GP discussed the medication review results with Psychiatry of old age service (POAS) input as required. Proposed changes were discussed with the resident (or family member)	Clinical

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			residents, families, care home staff and GPs - number of interviews not mentioned and pharmacists were not interviewed as part of this study		professionals and the resident or family member) with follow up	where possible There were at least four MDT meetings conducted The pharmacists also undertook resident follow up to help identify any potential adverse effects The time taken to undertake medication reviews and follow up residents; and total number, frequency and duration of MDT meetings was not mentioned	
Bruce, 2007	Scotland	Not reported	1340 residents, 40 care homes	To assess the impact of an intervention with a focus on the quality of prescribing and cost effectiveness	Medication review	A pharmacist undertook medication reviews for eligible residents informed by care home nursing records and GP notes Recommendations were discussed face-to-face with the resident's carer (often senior care home nursing staff) before being sent in writing to the GP The time taken to undertake medication reviews, develop and provide recommendations was not mentioned The pharmacist also supervised two technicians who undertook stock checks – the time taken to undertake these stock checks and whether the pharmacist was involved in stock ordering decisions was not mentioned	Not mentioned
Brulhart, 2011	Switzerland	24 months	329 residents, 10 nursing homes Feedback from	To assess the impact of a pharmacist-led medication review	Medication review - pharmacist-led followed by multidisciplinary	Once week before the multidisciplinary meeting, the pharmacist collected resident data and undertook a medication review of eligible residents and identified potential DRPs	Hospital

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			11 physicians (100%) and 23 nurses (100%) was obtained using a satisfaction questionnaire	with a focus on drug-related problems (DRPs)	case conference (pharmacist, physician and nursing staff)	During a multidisciplinary meeting (new meeting), the pharmacist discussed identified DRPs to be reviewed in collaboration with the responsible physician and one-two nurses At each one hour, monthly multidisciplinary meeting around five residents were reviewed The time taken to collect data and undertake medication reviews, and the total number of multidisciplinary meetings was not mentioned	
Carvajal, 2016	Spain	5 months	618 residents, 10 nursing homes	To assess the impact of a pharmacist intervention with a focus on inappropriate medication crushing	Education meetings Dose form modification review	The pharmacist reviewed eligible resident records and checked on the appropriateness of medication crushing. If required, the pharmacist contacted the company supplying the medication as part of this process Pharmacist recommendations were provided to the physician in writing or verbally The time taken to review records, check information and provide recommendations was not mentioned	Not mentioned
Chia, 2015	Singapore	6 months	480 residents, 3 nursing homes	To assess the impact of pharmacist reviews with a focus on potential cost savings and quality of care	Medication review	Pre-set up period: A pharmacist spent one month undertaking a medication review for eligible residents. This review took approximately 5 - 15 minutes per resident. Medication review findings were provided to the resident's prescriber Weekly visits of two hour duration between pre-set up	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
						and post-set up period: A pharmacist reviews approximately 10 - 15 eligible residents each visit so that every resident was reviewed at least once Post-set up period (at 6 months): Residents are again reviewed and a pharmacist liaises with prescribers on review recommendations via range of communication methods (e.g. chart annotation, medical record documentation, face-to-face), depending on their preference Eligible residents received two medication reviews as part of this intervention The time taken to liaise with prescribers was not mentioned	
Christensen, 2004	United States	6 months	9208 residents, 253 nursing homes	To assess the impact of a pharmacist intervention with a focus on quality of use of medicines and medicine costs	Medication review	A pharmacist undertook a medication review for eligible residents during their usual nursing home visits, informed by a medication profile with potential drug therapy problem alerts A pharmacist used their usual communication methods e.g. phone, fax, chart notes to seek further information e.g. test results or consult with the prescriber on recommendations The time taken to undertake medication reviews, and provide recommendations or consult with prescribers was not mentioned	Consultant

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
Connolly, 2015	New Zealand	23 months	1998 residents, 26 residential aged care facilities Intervention group: 18 facilities Control group: 18 facilities	To assess the impact of a multidisciplinary intervention with a focus on hospitalisation rates	Education meetings Resident indicator monitoring Multidisciplinary case conference (gerontology nurse specialist, general practitioner, pharmacist, facility senior nurse, geriatrician) inclusive of medication review	Multidisciplinary team (MDT) meetings consisting of the study geriatrician, gerontology nurse specialist (GNS), physician, pharmacist and nurse manager were held The one hour MDT meetings were held monthly for the first three months. Six residents usually received a medication review at each meeting 52 MDT meetings were held in total with 281 residents discussed The duration of these meetings not mentioned	Not mentioned
Connolly, 2018	New Zealand	29 months	Intervention group: 1258 residents, 21 facilities Control group: 1934 residents, 42 facilities	To assess the impact of a multidisciplinary team intervention with a focus on emergency department presentations using sensitivity models	Multidisciplinary case conference (gerontology nurse specialist, general practitioner, pharmacist, facility senior nurse, geriatrician) inclusive of medication review Clinical coaching	Multidisciplinary team (MDT) meetings consisting of the study geriatrician, gerontology nurse specialist, pharmacist, general practitioner, senior nurse(s) and other health professionals (as needed) were held The one hour MDT meetings were held monthly for the first three months. Six residents usually received a medication review at each meeting 247 residents were discussed at the MDT meetings 42 MDT meetings were held in total with the duration of meetings not mentioned	Not mentioned
Crotty, 2004a	Australia	7 months	715 residents, 10 low level and 10	To assess the impact of an	Academic detailing	At the first 30 minute outreach visit pharmacists provided prescribers with evidence based falls	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			high level nursing homes Intervention group: 381 residents Control group: 334 residents 452 nursing home staff completed a satisfaction survey It was incidentally mentioned that focus groups with nursing home staff and physicians were held	outreach intervention with a focus on falls and stroke prevention	Audit and feedback Education meetings	reduction and stroke prevention information At the second 30 minute outreach visit pharmacist provided prescribers with a detailed audit report on falls rates, stroke risk reduction practices and psychotropic medications prescribing rates The study authors reported that 121 physicians received a total of 61 outreach visits from a pharmacist The pharmacist also visited the nursing homes to speak with staff about reducing psychotropic medication use The total number and duration of outreach visits and education meetings was not mentioned	
Crotty, 2004b	Australia	3 months	154 residents, 10 high level aged care facilities Intervention group: 50 residents (without case	To assess the impact of multidisciplinary case conferences with a focus on appropriateness of medications and resident behaviours	Multidisciplinary case conference (pharmacist, GP, geriatrician, nursing home staff and others) including	Before each case conference, a medication review was conducted - no further details provided Multidisciplinary case conferences consisting of the pharmacist, resident's GP, geriatrician, Alzheimer's Association of Australia SA representative and nursing home staff were convened to discuss resident medications. The case conferences were held 6 - 12	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			conferences - to determine if there was any carry-over effect) 50 residents (with case conferences) Control group: 54 residents It was incidentally mentioned that GP focus groups were held. Further details were not mentioned		medication review	weeks apart and two case conferences were held for each eligible resident The time taken to undertake medication reviews, total number and duration of case conferences was not mentioned	
da Costa, 2016	Portugal	12 months	126 residents, 4 nursing homes Intervention group: 63 residents Control group: 63 residents	To assess the impact of a pharmacist intervention with a focus on drug-related problems (DRPs)	Resident record review	Clinically relevant DRPs were prioritised for residents and a pharmacist provided recommended changes to prescribers in a letter Pharmacists also made recommendations to nursing staff, often in relation to administration time changes The time taken to make DRP recommendations to prescribers or nursing staff was not mentioned	Trainee
Davidsson, 2011	Norway	18 months	93 residents, 1 nursing home	To assess the impact of multidisciplinary medication reviews	Medication review - pharmacist-led followed by multidisciplinary	A pharmacist undertook a medication review for eligible residents and identified drug related problems (DRPs)	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
				with a focus on the quality of prescribing and ongoing maintenance	case conference (pharmacist, physician, nurses in charge)	A pharmacist joined a regular multidisciplinary case conferences consisting of the physician and nurses in charge to discuss identified DRPs and suggested medication changes The frequency, total number and duration of multidisciplinary case conferences, and time taken to undertake a medication review was not mentioned	
Eide, 2001	Norway	Not reported	467 residents, 5 nursing homes Intervention group: 388 residents Control group: 79 residents	To assess the impact of a pharmacist intervention on hypnotic administration and prescribing with a focus on facility level changes	Academic detailing Education meetings	The pharmacist with assistance from a clinical pharmacologist distributed preliminary hypnotic administration and prescribing reports to physicians, nurses and aged care directors based on available relevant results The pharmacist organised education meetings and had individual meetings with physicians and nurses to discuss the use of hypnotics The total number and duration of education meetings, and time taken to prepare reports was not mentioned	Hospital
Finkers, 2007	Netherlands	8 months	105 residents, 5 nursing homes	To assess the impact of multidisciplinary medication reviews with a focus on drug-related problems	Medication review - multidisciplinary (pharmacist and nursing home physician) with initial and follow up case conferencing	The hospital pharmacist identified eligible residents for a medication review approximately one week prior to the medication review meeting and provided this information to the nursing home physician One hospital pharmacist and the resident's nursing home physician met for an initial meeting and reviewed the residents' medication profile and developed a medication optimisation plan. Each medication review took approximately 30 minutes per resident	Hospital

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
						At the follow up meeting at six weeks, the same pharmacist and nursing home physician met to discuss any resident issues and further changes required to their medication profile The total number of initial and follow up meetings, follow up meeting time and time taken to identify eligible residents was not mentioned	
Foubert, 2019	Belgium	6 months	50 residents, 1 nursing home	To assess the impact of a pharmacist intervention with a focus on potentially inappropriate prescribing	Medication review followed by meeting with prescriber with care plan	A pharmacist undertook a medication review for eligible residents The pharmacist then met with a GP face-to-face to review the pharmacist's recommendations and develop a new pharmaceutical care plan for eligible residents The pharmacist, physician and senior nurses met to communicate the eligible resident's care plan (final meeting) The time taken to undertake medication reviews, total number, frequency and duration of the pharmacist-GP and final meetings was not mentioned	Community
Frankenthal, 2014	Israel	12 months	359 residents, 1 chronic care geriatric facility Intervention group: 183 residents	To assess the impact of pharmacist medication review with a focus on clinical and economic outcomes	Medication review using STOPP/START criteria	A pharmacist undertook a medication review at study opening, 6 months and 12 months for eligible residents Pharmacist recommendations were discussed with the chief physician at study opening and after 6 months - no further details mentioned The time taken to undertake medication reviews and details on how recommendations were discussed with	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			Control group: 176 residents			the chief physician (i.e. mode and duration) was not mentioned	
Furniss, 2000	United Kingdom	8 months	330 residents, 14 nursing homes Intervention group: 158 residents Control group: 172 residents	To assess the impact of a pharmacist medication review	Medication review with follow up	A pharmacist undertook a medication review for eligible residents which included consideration of any issues raised by nursing home staff After three weeks, the pharmacist revisited the nursing home to determine if any medication changes had been implemented and if there were any issues due to the resident's medication changes The time taken to undertake a medication review and follow up residents, as well as details on interaction with nursing home staff (i.e. mode and duration) was not mentioned	Not mentioned
Gemelli, 2016	United States	4 months	36 residents, 11 long-term care facilities	To assess the impact of a pharmacist intervention with a focus on inappropriate use of sedatives/hypnotics	Sedative/hypnotic use review	A pharmacist undertook a chart review for eligible residents Recommendations were documented in the resident's medication chart so that prescribers could access them The time taken to undertake a chart review was not mentioned	Not mentioned
Gonzalez Martinez, 2018	Spain	12 months	744 residents, 13 nursing homes	To assess the impact of a pharmacist intervention with a focus on clinically relevant drug-drug	Evaluation of DDIs identified by database	A pharmacist embedded into a nursing home as part of the multidisciplinary team evaluated CRDDIs identified by the Lexicomp Lexi-interact database Where appropriate, the pharmacist evaluated CRDDIs and provided recommendations to the physician in writing or verbally	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
				interactions (CRDDI)		The time taken to evaluate CRDDIs and provide recommendations was not mentioned	
Halvorsen, 2010	Norway	5 months - reported by study author when contacted in August 2020	142 residents, 3 nursing homes	To assess the impact of a multidisciplinary intervention with a focus on drug related problems (DRPs)	Medication review - pharmacist-led followed by multidisciplinary case conference (pharmacist, physician and primary nurse) with follow up	A pharmacist undertook a medication review for eligible residents and identified drug related problems (DRPs) The pharmacist joined the weekly multidisciplinary case conferences consisting of physicians and nursing staff in order to present and help address identified DRPs. Five to ten residents were considered at each meeting Three weeks after the case conference, the pharmacist assessed whether the changes were implemented either by checking the resident's records or asking nursing staff The total number and duration of multidisciplinary case conferences, time taken to undertake a medication review and follow up residents was not mentioned	Not mentioned
Inch, 2019	United Kingdom	3 months	40 residents, 6 care homes 28 participants (6 care home managers, 10 care home staff member, 2 residents, 3 relatives, 1	To test and refine aspects of the pharmacist independent prescriber (PIP) intervention to improve medication management	Medication review Prescribing Education meetings Medication management advice Improving health care team communication	PIPs undertook medication reviews, developed individualised pharmaceutical care plans (PCPs) for eligible residents, undertook prescribing (and deprescribing) activities, referred residents to other health care professionals (supported by a GP), liaised with GP practices, care homes and community pharmacies to improve communication, and provided training and medication management advice to care home and GPs	Registered as a pharmacist independent prescriber

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			dietician and 6 GPs) were interviewed from across four sites The four PIPs attended a focus group session or were individually interviewed over the phone			Details of the range of activities undertaken by the pharmacist (i.e. duration, frequency, time taken, mode) was not mentioned	
Jodar-Sanchez, 2014	Spain	12 months	332 residents, 15 nursing homes Intervention group: 210 residents Control group: 122 residents	To assess the impact (cost-effectiveness) of an intervention with a focus on quality of life and cost savings	Medication review - pharmacotherapy follow-up	A pharmacist uses the Dader Method of pharmacotherapy follow-up, inclusive of resident record review, initial resident interview, documenting the resident's current status, evaluating relevant treatment goals, proposing changes with the resident and GP, and ongoing interviews The average time to complete pharmacotherapy follow-up per resident was around 114 minutes	Not mentioned
King, 2001	Australia	8 months	75 residents, 3 nursing homes 40 Presenting GPs (70%) completed a questionnaire post-case conference It was incidentally mentioned that	To assess the impact of multidisciplinary case conference reviews with a focus on resident outcomes	Multidisciplinary case conference (at least one GP, the GP project officer, a pharmacist, other health care professionals and senior nursing home staff) with case management plan	A clinical pharmacist prepared notes on the resident's medications which incorporated nursing home staff feedback The pharmacist's notes informed the multidisciplinary case conferences consisting of at least one GP, the GP project officer, a pharmacist, other health care professionals and senior nursing home staff. Three residents were usually reviewed at each case conference The treating GP presented on their resident and led the 30 minute multidisciplinary case conference which	Clinical

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			feedback was obtained from Directors of Nursing from each nursing home post-case conference			informed the resident's case management plan The pharmacist was also responsible for recording the outcomes of the case conference The total number of weekly case conferences and time taken to prepare notes was not mentioned	
Lapane, 2011a	United States	12 months	6741 residents, 25 nursing homes 2003 Intervention group: 1711, 12 nursing homes 2004 Control group: 1492, 13 nursing homes 2004 Intervention group: 1769 residents, 12 nursing homes 2004 Control group: 1769 residents,	To assess the impact of a multi-faceted intervention with a focus on potential delirium, falls, hospitalisations and mortality	Medication review with follow up	When the consultant pharmacist visited nursing homes every month to undertake medication reviews for residents (usual care), they used automated Geriatric Risk Assessment MedGuide reports to inform their reviews. They also shared the report findings with nursing staff At each visit, pharmacists were also encouraged to observe residents, document their recommendations and review resident care plans with nursing staff The time taken to observe residents, provide recommendations and liaise with nursing staff was not mentioned	Consultant

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			13 nursing homes				
Lapane, 2011b sibling study	United States	28 months	Intervention group: 12 care nursing homes Control group: 13 care nursing homes	To assess the impact of the Fleetwood Model with a focus on inappropriate medication use, mortality and hospitalisations	Fleetwood model of care - medication review, communication with prescriber with care plan	Pharmacists provided the Fleetwood model of care plus usual care to residents identified through pharmacy software as being more likely to have medication-related problems These higher risk residents received a medication review with recommendations made to the prescriber The time taken to undertake medication reviews and provide recommendations was not mentioned	Dispensing Consultant Around 47% held a doctorate of pharmacy degree
Lee, 2017	Canada	2 months	28 residents, 1 nursing home	To assess the impact of discontinuing long-term proton pump inhibitors (PPI) in residents	PPI use review with resident follow up	The pharmacist assessed eligible resident records using the PPI deprescribing algorithm of the Ontorio Pharmacy Research Collaboration (OPEN) and consulted with nursing staff and/or residents as part of this process Recommendations for PPI discontinuation were faxed to the most relevant physician's outpatient clinic. If no response was received within one week, the pharmacist sent the recommendations to the aged care facility medical director Once the recommendations were considered by the physician (or aged care facility medical director), the pharmacist actively monitored residents at weekly intervals for eight weeks. This included reviewing resident records and consulting with care aides, nursing staff, physicians and residents	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
						If an adverse event was identified, the pharmacist used their discretion to make a further recommendation (by fax or phone) to the resident's physician or the aged care facility medical director The time taken to consult with others and actively monitor residents was not mentioned	
Leguelinel-Blache, 2019	France	10 months	49 residents, 1 nursing home	To assess the impact of a multidisciplinary intervention with a focus on cost saving and resident safety	Medication review - pharmacist-led followed by multidisciplinary case conference (pharmacist, physician and nurse)	Two pharmacists (one junior and one senior supervisor) undertook a medication review for eligible residents If medication changes were needed, the senior pharmacist arranged a multidisciplinary meeting with the resident's GP and a nurse to discuss the proposed changes Five to eight residents were discussed at each meeting The time taken to undertake medication reviews, total number and duration of GP-nurse-pharmacist meetings was not mentioned	Hospital
Lenander, 2018	Sweden	Not reported	1720 patients with approximately 88% (1508) nursing home residents	To assess the impact of a medication review with a focus on potentially inappropriate medication use	Medication review - pharmacist-led followed by multidisciplinary case conference (pharmacist, responsible GP, nurse and caregiver if possible)	A pharmacist undertook a medication review for eligible patients A team meeting consisting of the pharmacist, responsible GP, nurse and caregiver (as needed) met to discuss the identified drug related problems (DRPs) and access additional patient information The team meeting was held one - two weeks after the pharmacist conducted the medication review	Minimum of three year's experience undertaking medication reviews

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
						The time taken to undertake medication reviews, total number, frequency and duration of team meetings was not reported	
Maidment, 2018	United Kingdom	6 months	34 residents, 5 care homes 21 health care professionals (3 GPs, 5 care home managers and 13 care staff) were interviewed up to 15 minutes each	To assess the impact of a specialist dementia care pharmacist medication review in combination with nursing staff training with a focus on antipsychotic use	Medication review Education meetings	A specialist pharmacist undertook a medication review for eligible residents The pharmacist provided recommendations to the GP with a follow up phone call also made The time taken to undertake medication reviews and provide recommendations, and the number of follow up phone calls made and associated time taken was not mentioned	Specialist experience in dementia care
McDerby, 2019	Australia	6 months	204 residents, 2 nursing homes Intervention group: 104 residents Control group: 100 residents	To assess the impact of an on-site pharmacist with a focus on medication administration	Quality improvement activities e.g. medication administration Medication reviews	The on-site pharmacist undertook quality improvement activities relating to medication trolley storage and labelling The on-site pharmacist conducted medication reviews for all eligible residents receiving dose form modifications and made recommendations to optimise these modifications The time taken to conduct quality improvement activities, medication reviews and provide recommendations was not mentioned	Accredited pharmacist with previous experience undertaking residential medication management reviews (RMMRs) at both study sites
McDerby, 2020 Sibling study	Australia	6 months	204 residents, 2 nursing homes Intervention	To assess the impact of an on-site pharmacist with a focus on quality	Organisational-oriented strategies e.g. education	An on-site pharmacist was employed in a nursing home (0.4 full time equivalent), collaborated with the care team and undertook a range of activities (organisational-oriented and resident-oriented)	Previous experience undertaking residential

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			group: 104 residents Control group: 100 residents	use of medicines indicators	meetings, quality improvement activities Resident-oriented clinical strategies	Details of the range of activities undertaken by the pharmacist (i.e. duration, frequency, time taken, mode) was not mentioned	medication management reviews (RMMRs) at both study sites
Midlov, 2002	Sweden	6 months	158 residents, 48 nursing homes Intervention group: 92 residents Control group: 66 residents	To assess the impact of a multi-speciality team intervention with a focus on health-related quality of life, activities of daily living (ADL) and confusion in residents with Parkinson's disease or epilepsy	Medication review - pharmacist-led followed by multi-speciality team review (pharmacist, pharmacist with neurology experience, a physician, neurologist, neuro-psychiatrist and clinical pharmacologist)	A pharmacist documented available information for eligible residents gathered through contact with residents, nursing home staff and physicians A pharmacist joined a new multi-speciality team, consisting of a pharmacist, pharmacist with neurology experience, a physician, neurologist, neuro-psychiatrist and clinical pharmacologist to review the resident's available information The frequency, total number and duration of multi-speciality meetings, as well as details on interactions with residents, nursing home staff and physicians (i.e. mode and duration) was not mentioned	Not mentioned
Milos, 2013	Sweden	6 months	369 patients with approximately 76% (229) nursing home residents Intervention group: 182 participants	To assess the impact of a pharmacist-led medication review with a focus on potentially inappropriate medications	Medication review	A pharmacist undertook a medication review for eligible participants using information provided by nursing staff or physicians Recommendations were documented in the participant's electronic medical record The time taken to undertake medication reviews and provide recommendations was not mentioned	Minimum of four year's experience undertaking medication reviews

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			Control group: 187 participants				
Motycka, 2012	United States	12 months	180 residents, 1 long-term care facility Intervention group: 53 INR results were monitored by the clinical pharmacist Control group: 499 INR results were monitored by long-term care facility staff	To assess the impact of pharmacist warfarin monitoring and associated cost savings	INR report review inclusive of requesting INR orders and holding warfarin doses	A clinical pharmacist monitored the warfarin usage and INRs of eligible residents, inclusive of requesting additional INR orders and holding warfarin doses Details of the intervention activities undertaken by the pharmacist (i.e. duration, frequency, time taken) was not mentioned	Clinical
Pasay, 2019	Canada	28 months	Total number of residents not specified, 42 rural nursing homes Intervention group: Total number of residents not specified, 21 nursing homes Control group:	To assess the impact of an antimicrobial stewardship intervention with a focus on urinary tract infection treatment	Education meetings Academic detailing Clinical decision-making tool	An antimicrobial pharmacist provided face-to-face education sessions to nursing home staff and academic detailing in small groups to physicians The total number, duration and frequency of the education sessions and academic detailing was not mentioned	Antimicrobial pharmacist trained to undertake academic detailing

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			Total number of residents not specified, 21 nursing homes				
Patterson, 2010	United Kingdom	12 months	334 residents, 22 nursing homes Intervention group: 173 residents, 11 nursing homes Control group: 161 residents, 11 nursing homes	To assess the impact an adapted US model of care (Fleetwood Model) with a focus on psychoactive medications and falls	Fleetwood model of care - medication review followed by meeting with prescriber with care plan	A pharmacist undertook a medication review for eligible residents during monthly nursing home visits, including interviewing the resident, nursing staff and family members (if needed) to assess the resident's pharmaceutical care needs Pharmacist recommendations were generally discussed with nursing staff and with the resident or family member (wherever possible) A meeting between the pharmacist and GP to discuss the resident's medication and recommendations then occurred face-to-face The time taken to undertake medication reviews and discuss recommendations, and the total number and duration of the GP-pharmacist meetings was not mentioned	Previous experience in medication review or older people care
Patterson, 2011 sibling study	United Kingdom	12 months	334 residents, 22 nursing homes Intervention group: 173 residents, 11 nursing homes	To assess the impact (cost-effectiveness) of an adapted US model of care (Fleetwood model)	Fleetwood model of care - medication review followed by meeting with prescriber with care plan	A pharmacist undertook a medication review for eligible residents Pharmacists worked with GPs to help improve psychoactive medication prescribing The time taken to undertake medication reviews, as	Community

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			Control group: 161 residents, 11 nursing homes			well as details on working with GPs (i.e. mode, duration, frequency) was not mentioned	
Roberts, 2001	Australia	12 months	3230 residents, 52 nursing homes Intervention group: 905 residents, 13 nursing homes Control group: 2325 residents, 39 nursing homes	To assess the impact of a multifaceted clinical pharmacy intervention with a focus on medication use, morbidity and mortality	Medication review Education meetings Medication management advice	A pharmacist undertook a medication review for eligible residents The pharmacist provided recommendations in resident records Nursing home staff and the clinical pharmacists discussed medication management and specific resident medication issues face-to-face Problem-based education sessions were provided to nursing staff. A total of six - nine sessions were provided across the nursing homes. Each nursing home received approximately 11 hours of education sessions. In addition, supporting resources and follow up was provided which averaged to around 26 contact hours at each nursing home The time taken to undertake medication reviews, provide and discuss recommendations with nursing staff was not mentioned	Held a clinical pharmacy postgraduate diploma
Sargent, 2016	Canada	24 months	197 residents, 3 long-term care facilities (excluding speciality care wards)	To assess the impact of a pharmacist-managed warfarin protocol with a focus on INR	INR report review using Calgary Warfarin Protocol (protocol)	The pharmacist is sent the resident's INR report and decides on the appropriate warfarin dose as per the protocol The pharmacist also ordered additional INR tests as per the protocol	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			Intervention group: 116 residents Control group: 81 residents 106 staff (72%) from the intervention group sites and 72 staff (67%) from the control group site completed a satisfaction survey	therapeutic range time		The time taken to undertake intervention activities was not mentioned	
Strauven, 2019	Belgium	12 months	1804 residents, 54 nursing homes Intervention group: 847 residents, 24 nursing homes Control group: 957 residents, 30 nursing homes	To assess the impact of a multifaceted complex intervention with a focus on prescribing appropriateness	Inter-professional education Multidisciplinary case conference (general practitioner, pharmacist and nurse) inclusive of medication review Local interdisciplinary meetings	Local interdisciplinary case conferences (ICCs) consisting of a pharmacist, GP and nurse were held and included resident medication reviews A median of 3 ICCs per resident was conducted with each ICC having a 15 minute median duration ICCs were held every four months and a total of 1675 ICCs held across all nursing homes	Supply pharmacist
Stuijt, 2008	Netherlands	12 months	30 residents, 1 nursing home	To assess the impact of	Medication review - pharmacist-led	Two weeks before the planned medication review meeting the pharmacist randomly provided eligible	Community

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
				pharmacist-led medication review with a focus on prescribing quality	followed by multidisciplinary case conference (pharmacist, GP and care home staff member)	resident names (five - six residents) to the GP's practice A healthcare team meeting, comprising of the community pharmacist, GP and a care home staff member (representing the resident) was held to discuss the eligible resident's care and proposed recommendations made. Five residents were reviewed each meeting with each resident review taking around 15 minutes The pharmacist's recommendations could be implemented by the GP once lab results were monitored and/or the resident had been consulted by any healthcare team member (GP, pharmacist or care home staff member) The total number and duration of meetings was not mentioned	
Tandun, 2019	Canada	4 month	58 eligible residents, two long term care facilities Facility 1: 29 residents Facility 2: 29 residents	To assess the impact of a pharmacist-led Proton Pump Inhibitor (PPI) deprescribing intervention	Audit and feedback Academic detailing	A lead pharmacist obtained drug use evaluation reports for residents taking PPIs and provided this information to physicians based at the two facilities (months one - two) The lead pharmacist also met physician in-person at Facility 1 to discuss PPI deprescribing options. This was in addition to the lead pharmacist regularly attending weekly case conferences at their site During month three, the pharmacist actioned physician verbal orders for PPI changes and followed up residents post-PPI describing. The lead pharmacist	Clinical

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
						also provided updated information highlighting residents not yet reviewed to physicians as a reminder. Some physicians received this reminder via fax due to their limited nursing home visits. The other clinical pharmacist based at Facility 2 was also sent a reminder to follow up with that site's medication director During month four, the lead pharmacist followed up with the physicians who were sent a fax reminder and the pharmacist at Facility 2 The duration of physician-pharmacist meetings and week case conferences, and time taken to provide drug use evaluation information, and physician reminders and follow ups was not mentioned	
Tang, 2016	Denmark	5 months	12 residents, 1 nursing home	To assess the impact of medication reviews and pain monitoring in residents with dementia who display pain symptoms	Medication review	A community pharmacist undertook a medication review for eligible residents based upon information collected by nursing home staff and through liaison with nursing staff and resident (or family members) The community pharmacist discussed their medication review results with nursing staff. The finalised medication review with recommendations was sent to the resident's GP The time taken to undertake medication reviews, discuss and provide recommendations was not mentioned	Community

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
Trygstad, 2005	United States	6 months	6344 residents, 253 nursing homes	To assess the impact of a pharmacist intervention with a focus on potential drug therapy problem alerts and cost savings	Medication review Resident follow up	Consultant pharmacists undertook a medication review for eligible residents during their nursing home visits, informed by a medication profile with potential drug therapy problem alerts A pharmacist used their usual communication methods e.g. phone, fax, record notes to make recommendations and follow up on any medication changes The time taken to undertake medication reviews, provide recommendations and follow up was not mentioned	Consultant
Trygstad, 2009 sibling study	United States	9 months	253 nursing homes	To assess the impact (down stream) of a pharmacist intervention with a focus on medication related outcomes	Medication review	In addition to conducting a medication review and making recommendations, a pharmacist could also review new medication orders informed by the potential drug therapy problem alerts The time taken to undertake medication reviews, provide recommendations and review new orders was not mentioned	Consultant
Van der Spek, 2018	Netherlands	18 months	380 residents, 31 Dementia Special Care Units (DSCUs) Intervention group: 222 residents	To assess the impact of a biannual medication review with a focus on the appropriateness of psychotropic medications for residents with dementia	Education meetings Multidisciplinary case conferences (pharmacist, physician and nurse) inclusive of medication review and intervention	The multidisciplinary team, consisting of a physician, nurse and pharmacist completed medication reviews for each eligible residents at 0, 6 and 12 months Each eligible resident received three medication reviews as part of this intervention The multidisciplinary team also provided intervention evaluation feedback at 6 and 12 months prior to medication reviews being conducted	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			Control group: 158 residents		evaluation	The duration of the team meetings, and time taken to provide evaluation feedback was not mentioned	
Verrue, 2012	Belgium	6 months	384 residents, 2 nursing homes Intervention group: 230 residents Control group: 154 residents 11 GPs (39%) completed an evaluation survey	To assess the impact of a medication review on the appropriateness of prescribing	Medication review	A clinical pharmacist undertook a medication review and consulted on the recommendations with a geriatrician (who relied on the written information provided) The final recommendations were communicated to the treating GP - no further details mentioned The time taken to undertake medication reviews, consult with a geriatrician and provide recommendations was not mentioned	Clinical
Westbury, 2010	Australia	6 months	Total number of residents not specified, 25 nursing homes Intervention group: Total number of residents not specified, 13 nursing homes Control group: Total number of	To assess the impact of a multi-faceted, interdisciplinary intervention with a focus on antipsychotic and benzodiazepine use	Audit and feedback Education meetings Academic detailing Sedative use review	Community pharmacists used a specific medication audit program (DUE tool) to audit medications supplied by the community pharmacy and generate a de-identified audit report for each nursing home. The audit was conducted at baseline and at 12 weeks Community pharmacists delivered nursing staff education. The first session related to evidence-based benzodiazepine and antipsychotic use, and presented audit findings and facilitated sedative use discussion. The second training session related to the follow-up audit findings and reiterated the evidence-base. Both education sessions were conducted three - four weeks after each audit	Community

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			residents not specified, 12 nursing homes			102 nursing staff attended the first session and 70 nursing staff attended the second session The sedative review form was designed to support communication between the pharmacist (recommendations), physician (comments) and nurse (comments) The time taken to complete and generate the report audit was not mentioned, the duration of nursing staff education sessions, and time taken to complete the sedative review form was not mentioned	
Westbury, 2018	Australia	23 months	12,157 residents, 150 nursing homes	To assess the impact of a multi-strategic, interdisciplinary intervention on the prescribing of antipsychotics and benzodiazepines	Audit and feedback Education meetings Sedative use review	Consultant pharmacists provided nursing staff with one hour education sessions about psychotropic medication benchmarking and specific antipsychotic and benzodiazepine training at baseline and then 3 months later The pharmacist and champion nurse provided recommendations in each eligible resident's sedative use review which was then provided to the prescriber for their final decision The total number of education sessions and number of staff who attended, and time taken to provide recommendations on sedative use was not mentioned	Consultant
Wilchesky, 2018	Canada	12 months	44 residents, 3 nursing homes 22 health	To assess the impact of an interdisciplinary intervention using	Medication review - pharmacist-led followed by multidisciplinary	A pharmacist undertook a medication review for eligible residents The pharmacist's recommendations were discussed at	Clinical pharmacists working part-time at

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			professionals provided feedback by completing a semi-structured questionnaire - no further details provided	knowledge exchange (KE) with a focus on inappropriate medication use in residents with severe dementia	case conference (pharmacist, physician, family and treating nurse) Inter-professional education	multidisciplinary meetings which were attended by the treating physician, resident's family member and treating nurse (where possible) The time taken to undertake medication reviews, and the number, frequency and duration of meetings was not mentioned	nursing homes
Wouters, 2017	Netherlands	22 months	426 residents, 59 nursing home wards for long-term care Intervention group: 233 residents Control group: 193 residents	To assess the impact of a multidisciplinary medication review intervention with a focus on inappropriate medication use	Medication review followed by meeting with physician	A pharmacist undertook a medication review using the Multidisciplinary Multistep Medication Review (3MR) approach for eligible residents, inclusive of resident input obtained via questionnaire and resident records (step 1) and a pharmacist identifying potential medication changes (step 2) A multidisciplinary meeting (step 3) was held with the pharmacist and physician to review step 1 and 2 information. Action to be taken was then agreed to by both health care professionals prior to the physician taking any necessary action and advising nursing staff of this (step 4) Steps 1 - 3 took an average of 35 minutes per resident	Hospital or employed to undertake medication reviews
Zermansky, 2006	United Kingdom	6 months	661 residents, 65 care homes Intervention group: 331 residents	To assess the impact of a pharmacist-led medication review with a focus on medication changes	Medication review	A pharmacist conducted a medication review which included communicating with the resident and carer. Review recommendations were developed with the resident and carer Written recommendations were provided to the GP	Not mentioned

Author, Year	Study location	Study period (inclusive of any follow up)	Study population and setting	Study aims/goals	Intervention strategies	Details of intervention undertaken by pharmacist(s)	Details of pharmacist (s) involved in intervention
			Control group: 330 residents			The time taken to undertake medication reviews and provide recommendations was not mentioned	

Additional file C Key data extracted – intervention type, evaluation approach, evaluation tools and assessment of implementation fidelity

Author, Year	Intervention type	Evaluation approach	Evaluation tools used	Implementation fidelity assessed
Anrys, 2019 sibling study	Multi-faceted	Process	Medical Research Council guidance on process evaluation of complex interventions	Not mentioned
Balsom, 2020	Multi-faceted	Outcome	Not mentioned	Not mentioned
Baqir, 2014	Multi-faceted	Outcome	Not mentioned	Not mentioned
Brulhart, 2011	Multi-faceted	Outcome	Not mentioned	Not mentioned
Carvajal, 2016	Multi-faceted	Outcome	Not mentioned	Not mentioned
Connolly, 2015	Multi-faceted	Outcome	Not mentioned	Not mentioned However, the study authors did report that most planned meetings and all scheduled visits occurred as per the protocol
Connolly, 2018	Multi-faceted	Outcome	Not mentioned	Not mentioned However, the study authors did report that all planned meetings and visits occurred as per the protocol, and that there were no protocol deviations
Crotty, 2004a	Multi-faceted	Outcome	Not mentioned	Not mentioned However the study authors did report that the reliability of case note data extraction was assessed
Crotty, 2004b	Multi-faceted	Outcome	Not mentioned	Not mentioned
Christensen, 2004	Multi-faceted	Outcome	Not mentioned	Not mentioned

Author, Year	Intervention type	Evaluation approach	Evaluation tools used	Implementation fidelity assessed
Davidsson, 2011	Multi-faceted	Outcome	Not mentioned	Not mentioned
Eide, 2001	Multi-faceted	Outcome	Not mentioned	Not mentioned
Finkers, 2007	Multi-faceted	Outcome	Not mentioned	Not mentioned
Foubert, 2019	Multi-faceted	Outcome	Not mentioned	Not mentioned
Halvorsen, 2010	Multi-faceted	Outcome	Not mentioned	Not mentioned
Inch, 2019	Multi-faceted	Outcome	Medical Research Council guidance on developing and evaluating complex interventions	Not mentioned However the study authors did report that a random sample of eight documents completed by a pharmacist delivering the intervention were reviewed for appropriateness
Lapane, 2011a	Multi-faceted	Outcome	Not mentioned	Not mentioned
Lapane, 2011b sibling study	Multi-faceted	Outcome	Not mentioned	Not mentioned
Leguelinel-Blache, 2019	Multi-faceted	Outcome	Not mentioned	Not mentioned
Lenander, 2018	Multi-faceted	Outcome	Not mentioned	Not mentioned
Maidment, 2018	Multi-faceted	Outcome and process	Medical Research Council guidance on developing and evaluating complex interventions	Not mentioned
McDerby, 2020	Multi-faceted	Outcome	Not mentioned	Not mentioned

Author, Year	Intervention type	Evaluation approach	Evaluation tools used	Implementation fidelity assessed
McDerby, 2019	Multi-faceted	Outcome	Not mentioned	Not mentioned
Midlov, 2002	Multi-faceted	Outcome	Not mentioned	Not mentioned
Pasay, 2019	Multi-faceted	Outcome	Not mentioned	Not mentioned
Patterson, 2010	Multi-faceted	Outcome	Not mentioned	Not mentioned
Patterson, 2011 sibling study	Multi-faceted	Cost-effectiveness	Not mentioned	Not mentioned
Roberts, 2001	Multi-faceted	Outcome	Not mentioned	Not mentioned
Sargent, 2016	Multi-faceted	Outcome	Not mentioned	Not mentioned
Strauven, 2019	Multi-faceted	Outcome	Medical Research Council guidance on developing and evaluating complex interventions	Not mentioned
Stuijt, 2008	Multi-faceted	Outcome	Not mentioned	Not mentioned
Tandun, 2019	Multi-faceted	Outcome	Not mentioned	Not mentioned
Trygstad, 2005	Multi-faceted	Outcome	Not mentioned	Not mentioned
Trygstad, 2009 sibling study	Multi-faceted	Outcome	Not mentioned	Not mentioned
Van der Spek, 2018	Multi-faceted	Outcome	Not mentioned	Not mentioned

Author, Year	Intervention type	Evaluation approach	Evaluation tools used	Implementation fidelity assessed
Wilchesky, 2018	Multi-faceted	Outcome	Not mentioned	Not mentioned
Westbury, 2010	Multi-faceted	Outcome	Not mentioned	Not mentioned
Westbury, 2018	Multi-faceted	Outcome	Theoretical Domains Framework	Not mentioned
Wouters, 2017	Multi-faceted	Outcome	Not mentioned	Not mentioned However, study authors stated that pharmacist and physician adherence to the protocol was checked. In addition, non-adherence to allocation i.e. when resident did not receive intervention was also reported

Author, Year	Intervention type	Evaluation approach used	Evaluation tools used	Implementation fidelity assessed
Alldred, 2007 sibling study	Single-faceted	Outcome	Not mentioned	Not mentioned
Bach, 2017	Single-faceted	Outcome	Not mentioned	Not mentioned
Bruce, 2007	Single-faceted	Outcome	Not mentioned	Not mentioned
Chia, 2015	Single-faceted	Outcome	Not mentioned	Not mentioned
da Costa, 2016	Single-faceted	Outcome	Not mentioned	Not mentioned
Frankenthal, 2014	Single-faceted	Outcome	Not mentioned	Not mentioned
Furniss, 2000	Single-faceted	Outcome	Not mentioned	Not mentioned
Gemelli, 2016	Single-faceted	Outcome	Not mentioned	Not mentioned

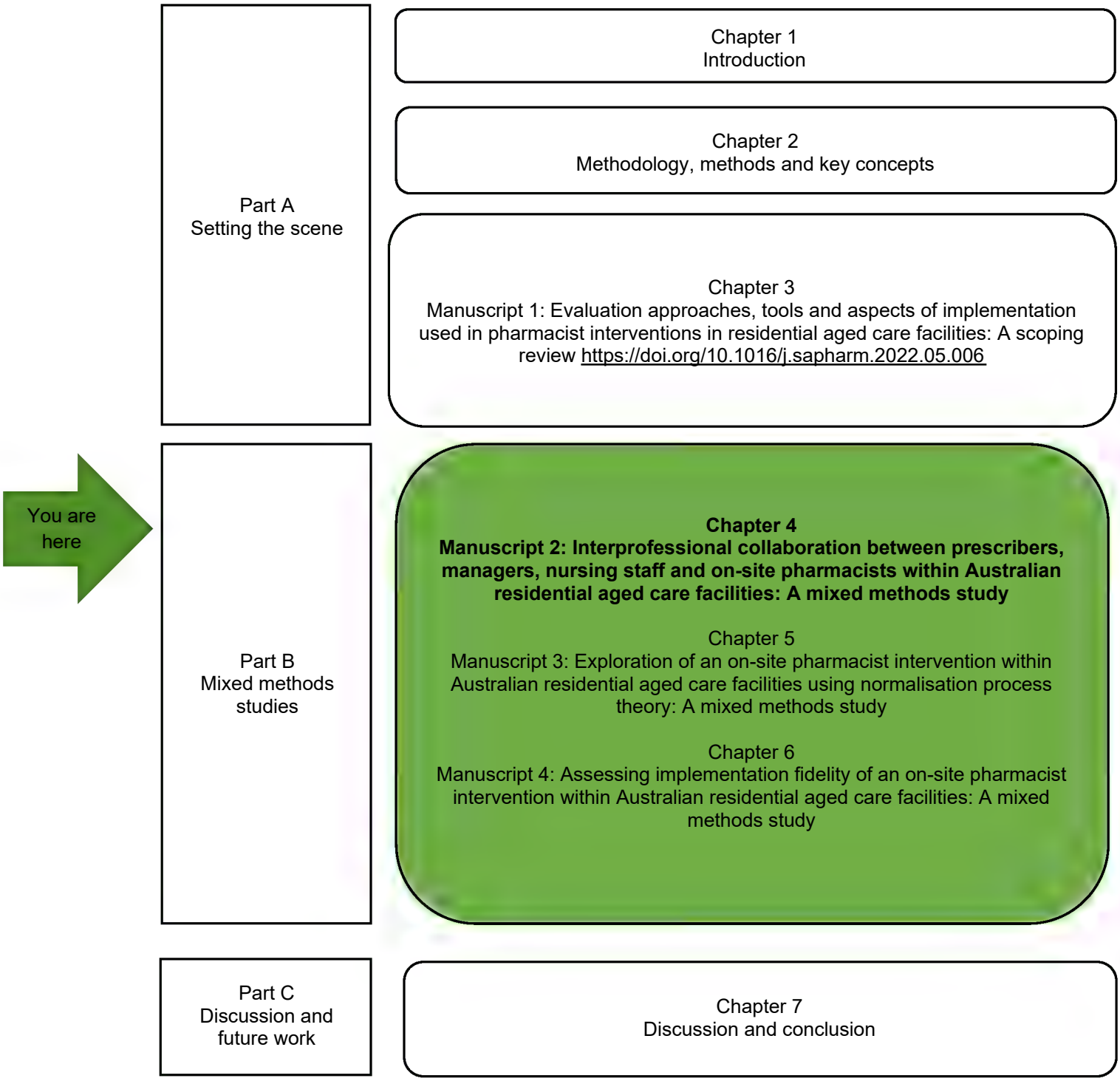
Author, Year	Intervention type	Evaluation approach used	Evaluation tools used	Implementation fidelity assessed
González Martínez, 2018	Single-faceted	Outcome	Not mentioned	Not mentioned
Jodar-Sanchez, 2014	Single-faceted	Cost-effectiveness	Not mentioned	Not mentioned
King, 2001	Single-faceted	Outcome	Not mentioned	Not mentioned
Lee, 2017	Single-faceted	Outcome	Not mentioned	Not mentioned
Milos, 2013	Single-faceted	Outcome	Not mentioned	Not mentioned
Motycka, 2012	Single-faceted	Outcome	Not mentioned	Not mentioned
Tang, 2016	Single-faceted	Outcome	Not mentioned	Not mentioned
Verrue, 2012	Single-faceted	Outcome	Not mentioned	Not mentioned
Zermansky, 2006	Single-faceted	Outcome	Not mentioned	Not mentioned

Additional file D Implementation factor taxonomy

Jorgenson et al.'s [65] categories	Pharmacist role definition Value of the pharmacist role Pharmacist personality and professional experience Pharmacist presence and visibility Relationships, trust and respect Orientation and support Resources and funding
Adapted categories based upon Jorgenson's et al. [65] categories and additional categories generated inductively	Pharmacist role definition Value of the pharmacist role Pharmacist personality and professional experience Pharmacist presence and visibility Relationships, trust and respect – for this scoping review, this category was extended to reflect both prior relationships between pharmacists and other health care team members (as per Jorgenson et al.'s [65] paper), as well as pharmacists establishing new relationships with health care team members Collaboration amongst health care team members Resident or health care team member buy in Communication method used Prescriber professional concerns - this category encompasses potential concerns about the pharmacist as a threat to physician's status, GP reluctance for decisions to be questioned, concerns about patient's potential deterioration, reluctance to change medications initiated by a specialist, reluctance to change medications if family members prefer maintenance of status quo Organisational factors - this category encompasses RACF staff knowledge and skills, staff turnover rates, key stakeholders on leave, workload demands, information available to visiting pharmacists and culture of the organisation. For noting: the orientation and support (from management) category is nested under 'organisational factors' External factors - this category encompasses intervention impact on health care team member time, time available for GP involvement, other related programs introduced which were potential confounding factors, resources and funding. For noting: the resources and funding (for limited timeframe) category is nested under 'external factors' Intervention characteristics - this category encompasses resident involvement, prior RACF exposure to this intervention strategy, focus on specific medication issues, intervention strategies used, positive perception of intervention methods or aspects, intervention audience targeted

Additional file E Implementation factor table

Implementation factor	Reported as facilitator	Reported as barrier
Value of the pharmacist role	12 [21,26,74,76,84,85,87,92,93,96,104,126]	Not reported
Relationships, trust and respect	9 (when present) [26,81,84,93,106,111,112,114,116]	6 (when absent) [82,90,92,93,98,114]
Pharmacist presence and visibility	3 (when present) [111,114,116]	2 (when absent) [107,115]
Collaboration amongst health care team members	7 (when present) [75,87,105,112,113,120,123]	2 (when absent) [21,83]
Resident or health care team member buy in	4 (when present) [26,84,119,122]	8 (when absent) [26,82,86,87,92,96,109,110]
Communication method used	4 (when direct) [26,112,114,117]	7 (when indirect) [91,92,95,96,108,115,124]
Pharmacist role definition	1 [123]	1 [26]
Pharmacist personality and professional experience* *only professional experience mentioned, not personality	3 [87,93,117]	3 [26,78,118]
Organisational factors such as RACF staff knowledge and skills, staff turnover rates, key stakeholders on leave, workload demands, information available to visiting pharmacists, culture of the organisation, orientation and support	3 [26,87,122]	11 [26,74,75,82,83,92,104,113-115,118]
External factors such as intervention impact on health care team member time, time available for GP involvement, other related programs introduced which were potential confounding factors, resources and funding	3 [90,93,126]	12 [21,74,92,98,100,104,106,108,112,113,118,125]
Prescriber professional concerns such as potential concerns about the pharmacist as a threat to physician's status, GP reluctance for decisions to be questioned, concerns about patient's potential deterioration, reluctance to change medications initiated by a specialist, reluctance to change medications if family members prefer maintenance of status quo	Not reported	4 [26,74,93,123]
Intervention characteristics such as resident involvement, prior RACF exposure to this intervention strategy, focus on specific medication issues, intervention strategies used, positive perception of intervention methods or aspects, intervention audience targeted	8 [21,73,87,96,98,104,110,121]	9 [83,84,99,100,104,113,118,124,125]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Declaration for Thesis Chapter 4

Declaration by candidate

In the case of Chapter 4, the nature and extent of my contribution to the work was the following:

Nature of Contribution	Extent of Contributions (%)
Miranda Batten was the lead author of the manuscript, designed the study design, undertook qualitative and quantitative data collection, analysis and interpretation, wrote and submitted the manuscript	80%

The following co-authors contributed to the work:

Name	Nature of Contribution	Contributor is also a UC student (Yes/No)
Sam Kosari	Research supervision, assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Joanne Lewis	Research supervision, assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Mark Naunton	Research supervision, assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Karen Strickland	Assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N

Candidate's Signature

24__/__10__/___2022__
Date

Declaration by co-authors

The undersigned hereby certify that:

(7) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
(8) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
(9) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
(10) there are no other authors of the publication according to these criteria;

(11)potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(12)the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

[Please note that the location(s) must be institutional in nature, and should be indicated here as a department, centre or institute, with specific campus identification where relevant.]

Location(s):	Health Research Institute, University of Canberra

Signatures	Date
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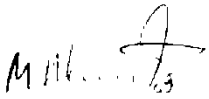
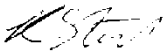
	31/10/2022
	31/10/2022

4.1 Introduction to manuscript

For the purposes of this thesis, interprofessional collaboration is defined as *'the process in which different professional groups work together to positively impact health care'* (Zwarenstein et al., 2009, p. 3). This definition is consistent with the World Health Organization's definition of collaborative practice (Health Professions Networks Nursing & Midwifery Human Resources for Health, 2010). Previous systematic reviews have recommended that collaboration within the pharmacist intervention in RACF context be researched further (Lee et al., 2019; Verrue et al., 2009). These recommendations are consistent with the findings of a recent systematic review which concluded that pharmacists most commonly worked with nurses and general practitioners when providing interprofessional interventions within RACFs (Sadeq et al., 2022). Exploring interprofessional collaboration in relation to the OSP intervention also addresses a potential gap identified in the scoping review reported in Part A (Chapter 3).

The objectives of this study were to evaluate the extent of interprofessional collaboration between prescribers, managers and nursing staff and OSPs the nature of these interprofessional collaborative working relationships.

4.2 Manuscript

This manuscript is currently under review for publication with Age & Ageing.

4.3 Abstract

Background: A new on-site pharmacist (OSP) model of care within Australian Residential Aged Care Facilities (RACFs) is being investigated to help reduce medication related harm. Interprofessional collaboration amongst prescribers, nursing staff and pharmacists is critical to reducing medication related harm.

Objective: To explore the extent of interprofessional collaboration and the working relationships that may exist between OSPs and prescribers, managers and nursing staff.

Methods: A mixed methods study was undertaken within the context of a 12 month cluster randomised controlled trial. Semi-structured interviews were conducted and a survey based upon the Physician-Pharmacist Collaboration Index (PPCI) was distributed at two time points

(T1 from 3 months and T2 from 9 months of OSP commencement) across seven intervention RACFs.

Results: The interviews (n=33) indicated that trusted relationships were routinely established within 2 – 4 months and maintained through on-site proximity by OSPs whom health care team members considered beneficial. The PPCI survey mean score at T1 (n=33) was 83.7 ± 2.1 and 85.6 ± 2.1 at T2 (n=19), higher score represents a more positive working relationship. There was no difference in PPCI scores at T1 and T2 scores (p=0.96) which also suggests that positive working relationships were established by 3 months and maintained at 9 months.

Conclusions: This study is the first to explore interprofessional collaboration between OSPs and health care team members in RACFs. The results showed positive interprofessional collaborative relationships which were underpinned by a range of processes, OSP characteristics and perceived (or potential) benefits of OSPs working within RACFs.

Key words: interprofessional collaboration, residential aged care, pharmacist, collaborative care

4.4 Introduction

Residents living in Australian residential aged care facilities (RACFs) experience high rates of medication related harm accompanied by poor resident outcomes and high healthcare costs [1-3]. To address these, there has been increasing interest in the potential role of pharmacists [4-7]. A new on-site pharmacist (OSP) model of care was piloted in an Australian Capital Territory (ACT) RACF and showed some benefit [8,9]. This pilot study attributed the OSP's proximity to health care team members as contributing to these stakeholders' regular communication and information exchange [9].

This mixed methods study was conducted within the context of a 12 month cluster randomised controlled trial relating to the implementation and evaluation of an OSP model of care in RACFs (PiRACF study) with seven intervention and eight control RACFs participating in the study [10]. In the PiRACF study, an OSP was directly employed by a RACF on a part-time basis. A key aspect of this OSP model of care was that the OSP was expected to facilitate more frequent collaboration between health care team members, improve interprofessional collaborative care and thereby reduce medication related harm.

Interprofessional collaboration is *'the process in which different professional groups work together to positively impact health care'* [11] and it is the collaboration between prescribers, nursing staff and pharmacists that is an essential component for reducing medication related harm [12]. Current health related interprofessional collaboration literature indicates physicians, nurses and pharmacists are the health professional groups most frequently studied [13,14].

Given the newness of this OSP model of care, there is limited understanding of the extent and nature of interprofessional collaborative working relationships between OSPs and health care team members (in particular, prescribers, managers and nursing staff) within RACFs. This insight could help us to determine whether this OSP model of care facilitates interprofessional collaborative care within RACFs and whether further exploration of an OSP model of care is warranted within Australian RACFs.

Therefore, the objectives of this mixed method study were to explore the extent of interprofessional collaboration between OSPs and prescribers, managers and nursing staff and understand the nature of these interprofessional collaborative working relationships. This study also addresses an important gap identified in a recent scoping review which concluded that there was sparse exploration of interprofessional collaboration amongst pharmacists and health care team members within the evaluated pharmacist RACF intervention literature [15].

4.5 Methods

Study design

An embedded mixed method study was conducted to gain an understanding of this OSP model of care within the PiRACF study [10]. This mixed methods study was qualitative dominant with a small quantitative component incorporated to strengthen the overall study findings [16-18]. In this mixed methods study, the perspectives of prescribers, nursing staff and OSPs were sought in line with Verrue et al.'s recommendation that future pharmacist interventions in RACFs focus on the collaborative efforts between prescribers, nursing staff and pharmacists [19]. The perspectives of managers were also sought, consistent with other pharmacist intervention in RACF studies [20,21].

Data were collected through semi-structured interviews conducted between April and October 2021 with distribution of hard copy surveys and online survey links occurring at two time

points, T1 (from 3 months after commencement) and T2 (from 9 months after OSP commencement). These timeframes were pragmatically chosen noting the current literature [8,22] and the PiRACF study context.

As part of the development process, the interview guide and adapted survey were piloted by a prescriber and nurse who provided feedback to help establish face validity. The interview guide was informed by the literature and sought to gather insights for the PiRACF study evaluation as well as this study. For the purposes of this study, specific interview questions were underpinned by McDonough and Doucette's conceptual model for the development of pharmacist-physician collaborative working relationship (CWR) [23]. The three CWR model domains are participant, context and exchange characteristics[23,24]. While the CWR model has been commonly employed to explore the relationships between prescribers and community pharmacists [25], it has also been employed in other health care settings. For examples, the CWR model has also been used to explore primary care General Practitioner (GP) and pharmacist relationships [26] and prescriber, pharmacist and nurse relationships in inpatient settings [27,28]. Despite the contribution of pharmacists[1] to usual care in RACFs, no studies to date, have utilised the CWR model to explore interprofessional collaboration in this setting. The qualitative data reported is informed by the Consolidated Criteria for Reporting Qualitative Research checklist [29].

The surveys in this study were adapted from the 14-item Physician-Pharmacist Collaboration Index (PPCI) survey for physicians informed by the CWR model [30]. The PPCI survey was tested among a small cohort of United States primary care physicians (n=340) and provided insights into their perception of their working relationship with a pharmacist [30]. The survey domains relate to relationship initiation, trustworthiness and role specification [30]. In this study prescribers i.e. General Practitioners and Nurse Practitioners who had prescribing roles within the intervention RACFs, as well as managers and nursing staff i.e. registered nurses and enrolled nurses (who work under supervision of a Registered Nurse) were invited to complete the adapted survey. The reporting of this study is informed by Hadi et al.'s recommendations

[1] Usual care provided by pharmacists in Australia includes, but is not limited to pharmacists visiting RACFs to conduct reviews of resident's medications through the Residential Medication Management Review program, pharmacists visiting RACFs to provide Quality Use of Medicines services and community pharmacists supplying medications to RACF(s)

to improve mixed methods research reporting for pharmacy practice researchers [31]. The total number of prescribers, managers, nursing staff and OSPs in the seven RACFs was estimated to be approximately 127 based upon available RACF staffing data. The anticipated response rate for the survey at each time point was 33 consistent with a previous study employing PPCI surveys which had a response rate of 26% [32].

Participant selection

Prescribers, managers and nursing staff were invited to participate in the semi-structured interviews and surveys. OSPs were also invited to participate in the semi-structured interviews.

Qualitative data collection

A purposive (stratified) sample was sought across each of the RACFs to ensure a range of stakeholder perspectives across these health professional groups[33]. Email recruitment was facilitated by managers who sent emails, along with email reminders and individual invites to OSPs, staff and prescribers.

The lead author (MB) interviewed eligible participants via telephone (n=18), online video conferencing system (n=13) and face-to-face in a private RACF office (n=2). Interviews were audio-recorded and transcribed. Transcripts were checked against the audio-record and deidentified to maintain confidentiality and participant anonymity [34].

Quantitative data collection

Email recruitment was facilitated by managers, along with email reminders and individual invites to prescribers. In addition to use of the online platform Qualtrics, hard copy surveys and a locked survey box for completed survey return were provided to the RACFs.

Qualitative data analysis

Consistent with a qualitative descriptive approach, the interview data were analysed using framework analysis following Ritchie and Spencer's 5 step process[35]. This approach was chosen pragmatically [36] given the need to handle a large volume of qualitative data [37]. The initial coding framework was developed and then refined through regular discussions with co-authors. Ongoing discussions occurred throughout the data analysis and interpretation stages [38]

which increase the credibility of the key themes derived from the semi-structured interviews. To manage data and maintain a clear audit trail, NVivo 20 (QSR International) was employed [39].

Quantitative data analysis

Quantitative data was downloaded from Qualtrics and cleaned in Microsoft Excel. Hard copy surveys were entered into Qualtrics by the study team and all entered data was assessed against the hard copy surveys for quality assurance. The quantitative data was imported into SPSS [40] with descriptive statistics, inclusive of the PPCI score mean and standard deviations summarised for each of the domains. A 2-tailed independent sample t-test was undertaken to determine the statistical significance between the PPCI total scores at T1 and T2 – this decision was made based upon the small number of repeated survey completers for this study.

Data integration

For this mixed methods study, data integration occurred at the interpretation stage, with a complementarity approach to data integration employed [16]. The quantitative and integrated data findings are presented together given that the small quantitative component was employed to strengthen this qualitative dominant mixed-methods study.

Ethics consent

The Human Research Ethics Committee at University of Canberra (HREC-2007), ACT Health (2019/ETH13453) and Calvary Public Hospital Bruce (30-2019) approved this study. Prior to surveys and interviews, written consent from participants was obtained.

4.6 Results

Qualitative findings

Thirty-three interviews were undertaken with General Practitioners (n=7), Nurse Practitioners (n=2), managers (n=7), Registered Nurses (n=9), Enrolled Nurse (n=1) and OSPs (n=7 interviews with 6 OSPs [one OSP worked across two RACFs]) across the seven RACFs. Interview length ranged from 23 minutes to 163 minutes. The median duration of interviews

with prescribers, managers and nursing staff was 35 minutes. The OSP interview median duration was 148 minutes. Participant characteristics are described in Table 3.

Table 3: Semi-structured interview participant characteristics

Profession	**Number of participants**	**Age (years)**	**Gender**	**Length of employment at RACF (years)**	**Experience in aged care (years)**	**Professional experience (years)**
On-site pharmacist	6*	< 40 (4, 67%) > 40 (2, 33%)	F (56, 83%) M (1, 17%)	< 1 (6, 100%)	Experience conducting Residential Medication Management Reviews (2, 33%) Community pharmacist experience supplying medications to RACF(s) (1, 17%) Experience in delivering Quality Use of Medicines Services (0, 0%)	< 5 (1, 17%) > 10 (5, 83%)
RACF manager	8 managers (7 interviewed plus RACF manager who provided written feedback**)	< 50 (2, 25%) > 50 (6, 75%)	F (6, 75%) M (2, 25%)	< 1 (3, 37.5%) > 1 (5, 62.5%)	< 4 (2, 25%) > 4 (6, 75%)	< 15 (2, 25%) > 15 (6, 75%)
Nursing staff	9 RNs 1 EN	< 40 (5, 50%) > 40 (5, 50%)	F (10, 100%)	< 4 (6, 60%) > 4 (4, 40%)	< 4 (4, 40%) > 4 (6, 60%)	< 6 (2, 20%) > 6 (8, 80%)
Prescribers	8 prescribers 7 GPs (excluding one GP#) 2 NPs	< 40 (1, 12.5%) > 40 (7, 87.5%)	F (4, 50%) M (4, 50%)	< 2 (3, 37.5%) > 2 (5, 62.5%)	< 6 (4, 50%) > 6 (4, 50%)	< 8 (2, 25%) > 8 (6, 75%)

* 7 interviews were conducted with 6 OSPs; one OSP worked across two RACFs and was therefore interviewed twice

** includes characteristics of RACF manager who in lieu of an interview provided written feedback

does not include characteristics of GP who was interviewed but elected not to disclose their characteristics

The qualitative interviews identified 3 dominant themes – the process of establishing relationships, OSP characteristics supportive of these relationships, and the perceived (or potential) benefit of the OSP role. Details of these themes and sub-themes are outlined below.

The process of establishing relationships

The findings indicated that the process of establishing relationships between OSPs and prescribers, managers and nursing staff were most often characterised by OSPs needing to pro-actively interact with health care team members. These relationships were generally underpinned by health care team members who were undecided or slightly positive about the presence of an OSP within their RACF.

To some extent, OSPs needed to predominately take the lead when interacting with health care team members. OSP 1 described how they felt that they were the *'the new kid of the block'* [OSP 1] meaning that they needed to make connections with others and build relationships. Three OSPs mentioned that it took them between 2 – 4 months to establish rapport and build relationships with health care team members. Another OSP mentioned that the *'first three months at a facility is always the hardest'* [OSP 6] due to the need to prioritise getting to know people, working out processes and who to talk to and establishing relationships within the RACF. This is consistent with the insights of other professional groups with one manager describing the first few months of their OSP commencing at their RACF as a *'teething period'* [M1.1].

Importance of face-to-face interactions

When establishing these interprofessional collaborative working relationships, interactions between OSPs and health care team members commonly occurred face-to-face. These interactions were often positively received as '*it really feels like collaboration when you're there together'* [NP5.1].

Face-to-face interactions were highly beneficial for OSPs establishing relationships with prescribers. Prior to the study, there were no pre-existing relationships between any of the OSPs and prescribers interviewed. As such, an important process related to OSPs being proactive when establishing relationships with GPs. One OSP described their experience of going on medication rounds with a GP *'pretty much every week'* and for it taking many months *'to breakthrough'* [OSP 2] before the GP started to consider the OSP's recommendations. This highlights the importance of OSPs having face-to-face as well as ongoing interactions with GPs when establishing these relationships. Several OSPs found it challenging to establish relationships with prescribers when there were limited opportunities to interact face-to-face with prescribers within RACFs. The process of establishing relationships was ongoing for most OSPs throughout the PiRACF study due to RACF staff and management turnover, changes to RACF contracted supply pharmacies and commencement of new visiting GPs which occurred across five of the seven RACFs. Subsequently, most OSPs needed to continually establish relationships with incoming health care team members.

Importance of incidental and informal interactions

Managers, nursing staff and OSPs highlighted that OSPs being in close physical proximity, such as sitting and working near health care team members, facilitated interprofessional collaborative working relationships. As described by one OSP, working in the same office space as senior nursing staff and management '*facilitates casual interactions and the relationship develops by itself'* [OSP 6]. Furthermore by being on-site, there was an increased likelihood of incidental interactions between OSPs and GPs yielding positive resident outcomes. One manager described a situation wherein a GP walked into the RACF central office area, noticed that the OSP was present and said *'"Oh OSP 6, you're here", and sat and spent an hour with OSP 6 going over what she's done for that particular resident and has actually taken on board everything OSP 6 said and ceased medication'* [M6.1] resulting in that resident's medications being reduced from over 21 to 8 medications, *'just by [the GP] sitting with OSP 6 for that hour'* [M6.1]. That is, by being physically on-site and able to participate in incidental interactions, GPs and OSPs were able to work together collaboratively.

OSP characteristics supportive of establishing relationships

When interviewed, participants generally described OSPs positively with specific characteristics identified which appeared to help the OSP establish relationships with health care team members. When coupled with tangible RACF investment such as management actively advocating health care team members to work with OSPs, strong relationships were established.

Across the health professional groups, OSPs were often positively characterised as friendly, adaptable, approachable and having the '*right attitude to do something about it [medication management issues] without upsetting people'* [GP 1.1]. Several participants also acknowledged that it *'may have been different had it been a different person'* [M1.1]. As one nurse explained *'it's very easy to get caught up, and get down, and get stressed and feel miserable'* [EN 7.1] at times when working in a RACF. Consequently, the potential impact of an OSP being approachable and *'making an effort to say hi and good night to people'* [OSP 3] was perceived by OSPs and health care team members as important. There were no instances where OSPs were described as unapproachable. One NP described that their prescribing for one resident was questioned by an OSP, but that when the NP went through the therapeutic guidelines with the OSP, the NP found that it *'was a really valuable interaction. We each learned something'* [NP5.1]. Subsequently, the NP indicated that when they saw that OSP, '*I can walk up to them and ask a question and there's a mutual respect there'* [NP5.1]. This example highlights the importance of OSPs being approachable when it comes to establishing interprofessional collaborative working relationships.

Perceived (or potential) benefit of the OSP role

Across the 33 interviews conducted, participants consistently described the perceived (or potential) benefit of the OSP role from their perspectives. Participants often expressed that they trusted their OSP and that their OSP provided reassurance in relation to RACF medication management. Critically, GPs needed to see the benefit of the OSP role prior to deciding whether to collaborate with OSPs. When this occurred, the working relationships and resultant benefits for residents were noticeable. Some OSPs were also able to demonstrate an important role in increasing interprofessional care amongst the health care team within RACFs and there was no evidence to suggest that OSPs were perceived as encroaching upon the professional boundaries of the health professionals interviewed.

GPs needed time to experience the benefit of working with an OSP as demonstrated by a positive resident impact before deciding to collaborate with OSPs. One GP described how they began to realise that their OSP was *'very, very useful'* [GP 1.2] and start interacting with their OSP after observing that the OSP *'picked up a particular patient that had some blood work we'd not done that for a while, so somehow he just went through the cracks. So ordinarily, there's no way I would have picked up that'* [GP 1.2]. That is, their OSP identified a medication management issue which the GP believed would not have been addressed otherwise.

Once GPs considered that the OSP role was beneficial, their relationships with OSPs often shifted from predominately OSP initiated to more of a two-way relationship. As described by one OSP, *'now that the relationships are established [with GPs], I don't have to push at all'* [OSP 1] and one GP described the OSP as *'a good asset for the gap we had… She's onsite and it's much easier getting together to see the patient'* resulting in the opportunity to talk together with *'less misunderstandings and it's more effective'* [GP3]. Should this OSP model of care within Australian RACFs become more common and thus more familiar to GPs, this may further increase the likelihood of GPs engaging in '*working relationships with the pharmacist in the facility'* [OSP 2]. As described by one OSP, this relationship between OSPs and GPs is *'critical'* [OSP 6] as in its absence, *'it would be very, very difficult for me to get any change or outcomes'* [OSP 6] implemented within the RACF given that GPs decide on whether or not to accept proposed medication changes.

Trust and reassurance

Managers, NPs and nursing staff often reported that they trusted their OSP. As explained by one manager, they and their staff worked well with their OSP and *'it's so nice to work with somebody that you trust, that you go along well [with]'* [M1.2]. Some nursing staff also described how they felt comfortable asking *'a bit of a silly question'* [RN 4.1] of their OSP as they knew and trusted that their OSP would not judge them.

While not consistent across all professional groups, there was a perception amongst some managers and nursing staff that some GPs were more likely to accept insights from their OSP than from nursing staff. One nurse mentioned that they often asked their OSP to speak with the GP because '*I think the GP really listens to her because I think it's her clinical expertise on those things maybe'* [RN 5.1]. In addition, this nurse also considered that with their OSP

onboard, *'it's very easy to interact with GP because you've got that extra support'* [RN 5.1]. That is, this OSP model of care can facilitate increased interprofessional collaborative care within RACFs.

A number of prescribers described how their OSPs helped provide reassurance by being *'another eye looking at my prescribing'* [NP5.1] and acting *'like a cover for me'* [GP 1.2]. This perception was widespread irrespective of the OSPs' prior experience in aged care, and years of experience overall. OSPs were also described as providing reassurance to managers with respect to RACF medication management. One manager illustrated this by stating that with the OSP, '*we've pretty much gone from being non-compliant two years ago, to completely compliant. So I don't have any stress for accreditation, I don't have any stress around medications at all at this time.'* [M 6.1]. As part of their medication management role at that RACF, their OSP was described as keeping an eye on medication management such as charts being kept up to date, '*as well as working with everybody else here to make sure that everything is compliant'* [M 6.1]. That is, to support high quality medication management within the RACF, their OSP had an important role to play individually and as part of the wider health care team.

Overall none of the professional groups perceived that OSPs encroached upon their health professions boundaries. This finding was not unexpected given that health care team members were often perceived by OSPs as being '*very time-poor and busy'* [OSP 6] culminating in the perception that OSP assistance would often be appreciated when the OSP can 'take *a job off them, [so] that then they no longer have to do it'* [OSP 6].

Quantitative and integrated findings

There were 33 completed surveys at T1 and 19 completed surveys at T2. This meant that the survey response rate was 26% and 15% respectively. At both time points more nursing staff (n=22, n=9) completed the PPCI surveys, followed by managers (n=8, n=5) and then prescribers (n=3, n=5). Survey respondents were invited to provide a unique identifier response to link survey responses. Based upon these responses, it appeared that only one participant from T1 also completed a survey at T2. It is likely that the ACT COVID-19 lockdown from August 2021 contributed to the lower T2 survey response rate from the three remaining RACFs

participating in the PiRACF study. RACF staff turnover may have also been a contributing factor.

Overall PPCI scores for all participants for T1 and T2 are displayed in Table 4. For the PPCI survey, a higher score represents a more established and committed interprofessional collaborative working relationship. The purpose of the PPCI surveys were to enrich this study's qualitative dominant findings. The PPCI total scores at T1 and T2 suggests that positive interprofessional collaborative working relationships between OSPs and health care team members were established within 3 months and were maintained from 9 months. In addition, there was no difference in the PPCI total mean scores between T1 and T2 (p=0.96). These quantitative findings complement the qualitative findings of this study. Namely, that OSPs are able to develop and maintain interprofessional collaborative working relationships with prescribers, managers and nursing staff within 3 months, and that these relationships are consistently sustained from 9 months of OSP commencement.

Table 4: PPCI scores for T1 and T2 timepoints (format adapted from Makowsky et al., 2009) and Hakansson Lindqvist et al., 2019)

PPCI score for all participants	**PPCI score range**	**T1 PPCI score (mean ± SD)**	**T2 PPCI score (mean ± SD)**
Total PPCI score	14–98	83.7 ± 2.1 (n=33)	85.6 ± 2.1 (n=19)
PPCI domains:			
Relationship initiation	3–21	18.1 ± 2.2	19.2 ± 2.2
Trustworthiness	6–42	36.8 ± 2.0	38.6 ± 2.1
Role specification	5–35	28.8 ± 2.0	27.8 ± 2.0

4.7 Discussion

This mixed methods study is the first to explore the extent and nature of interprofessional collaborative working relationships between OSPs and prescribers, managers and nursing staff in RACFs. Exploration of this interprofessional collaboration using McDonough and Doucette's conceptual model for the for the development of pharmacist-physician collaborative working relationship, i.e. the CWR model [24] has yielded new and valuable insights into how positive interprofessional collaborative working relationships between OSPs and health care team members are developed and maintained, particularly with respect to the processes, OSP characteristics and perceived (or potential) benefits of OSPs working collaboratively with health care team members. These study findings have important implications given the

expanding role of pharmacists in Australian RACFs [41] and have also indicated that further exploration of this OSP model of care is warranted.

This study reaffirms the findings of previous studies underpinned by the CWR model [24]. Namely, that at the start, given the newness of this OSP model of care to health care team members, the OSP needed to assertively initiate communication with health care team members [28,42]. The relationships between OSPs and health care team members were more broadly supported by proximity [32], that is, the OSP being on-site and readily accessible [28].This then increased opportunities for informal regular interactions [26] and additionally increased the likelihood of the OSPs and health care team members working together collaboratively [43]. Given ongoing impacts of COVID-19, further research on how this OSP model of care might be employed when health professionals may need to work remotely (inclusive of using telehealth) is recommended.

Interestingly, previous studies which have explored interprofessional collaboration using the CWR model have seldom explored potential timeframes for relationship establishment [28,32]. By contrast, this study concluded that it took between 2 – 4 months for OSPs and health care team members to establish positive working relationship. This has implications for future adopters of this OSP model of care in the real-world and suggests that a new OSP model of care should remain in place for at least 6 months, if not longer within RACFs. Furthermore, for future studies, it may be useful to explore how interprofessional collaborative working relationships between OSPs and health care team members are developed and maintained over a longer timeframe, where applicable.

Consistent with the existing CWR literature, OSPs and health care team members (including GPs who visited RACFs) who had regular face-to-face interactions were able to establish good working relationships underpinned by trust [26,32,43]. Similar to other studies, once OSPs demonstrated their value to prescribers, this tended to prompt the development of trusted interprofessional collaborative working relationships [42]. Positive prescriber and pharmacist interprofessional collaborative working relationships is highlighted as being vital in primary care [13]. The prescriber and pharmacist relationship in RACFs is also important, particularly noting the value of interprofessional collaboration and medication reviews as intervention strategies to help reduce medication related harm amongst older people [44]. It is recommended that specific measures be taken when an OSP model of care is introduced within RACFs to help

foster these relationships. This could include RACF facilitation of face-to-face meet and greets between prescribers and OSPs, OSPs coordinating their working days with scheduled prescriber visits (and vice versa) along with advocating for increased access to timely and appropriate GP and NP services for residents living in RACFs. This final measure could support increased access to visiting GPs which might support increasing the scope of collaborative GP services which have been associated with improved resident outcomes [45]. It should be noted that if this OSP model of care becomes widely adopted in Australian RACFs, the increased ubiquity of OSPs and thus increased awareness of their role may also aid future prescriber and OSP interprofessional collaborative working relationships.

A novel finding of this study was that no health care team members perceived that OSPs were encroaching upon their professional boundaries, a concern mentioned in a previous seminal study which explored views of the then new pharmacist role within Australian general practices i.e. General Practice Pharmacists [46]. The absence of this concern in this study may be partially explained by Australian RACF factors such as staff turnover [47], limited time [47], limited access to visiting GPs [45] and as health care team members were able to interact with OSPs in situ. Further research seeking the perspectives of RACF care staff and allied health professionals (including pharmacists[2]) providing usual care in RACFs may be beneficial in determining whether the OSP role is perceived to encroach upon other inter and/or intra-professional boundaries.

This study found that pharmacist personality and approach played an important role in establishing interprofessional collaborative working relationships, in keeping with the existing CWR literature [28]. Further research in this field could be enhanced by exploration of pharmacist personality traits and determining exactly which traits were more supportive of OSPs developing positive interprofessional collaborative relationships with health care team members. One potential tool which could be employed is the Big Five Personality Test [48].

The PPCI scores for both time points of this study are consistent with PPCI scores reported in other studies conducted in inpatient [27,28] and community settings [32]. To the authors' knowledge,

[2] Usual care provided by pharmacists in Australia includes, but is not limited to pharmacists visiting RACFs to conduct reviews of resident's medications through the Residential Medication Management Review program, pharmacists visiting RACFs to provide Quality Use of Medicines services and community pharmacists supplying medications to RACF(s)

this is the first study to employ the adapted PPCI survey for use by prescriber and non-prescriber health care team members to assess their interactions with a pharmacist. Further research on the potential applicability of the adapted PPCI survey for prescriber and non-prescriber health care team members should be considered. Given the small number of repeated survey completers for this study, attributed, in part due to the turnover of RACF staff during the intervention, it is recommended that future studies attempt to address this study limitation wherever possible e.g. by obtaining larger survey samples within RACFs.

This study provides unique insights on interprofessional collaborative working relationships from the perspective of OSPs and health care team members in RACFs. The results of this study build upon the existing CWR literature [26-28,32,42,43]. In particular, this mixed methods study demonstrated that OSPs and health care team members can establish and maintain positive working relationships in RACFs and suggested that these positive working relationships can be established within 2 – 4 months of OSP commencement. A contribution of this study is that interprofessional collaboration has not been previously explored in evaluated pharmacist RACF interventions [15]. Furthermore, while the CWR model has been commonly employed in other health care settings [26-28,32], this study has demonstrated the utility of expanding use of the CWR model into a new health care setting, that is RACFs. Future research on the sustainability of an OSP model of care in RACFs in other geographical and socio-economic settings may also be beneficial.

Strengths and limitations

A strength of this study was that a mixed methods design was employed which included extensive semi-structured interviews and the use of an adapted survey underpinned by CWR to gain insights from prescribers, managers, nursing staff and OSPs across seven RACFs. A further strength was that this mixed-method study employed a qualitative dominant approach. Several limitations of this study must be acknowledged, such as its limited generalisability, low T2 survey response rate, different T1 and T2 survey respondents, potential for participant recall and positivity bias, and the potential that survey respondents may not have participated in interviews and vice versa. Qualitative and quantitative insights from other health care team members such as RACF care staff and allied health professionals providing care to residents living in RACFs, residents and family members were not obtained in this study.

4.8 Conclusion

This study provided insights into interprofessional collaborative working relationships arising from an OSP model of care being trialled in real-world RACFs. This study demonstrated that positive interprofessional collaborative working relationships between OSPs and prescribers, managers and nursing staff were established and maintained, and described the processes, OSP characteristics and perceived (or potential) benefits of OSPs working with health care team members in RACFs. These promising findings suggest that further exploration of an OSP model of care is warranted within Australian RACFs. Additionally, this study has addressed an important interprofessional collaboration gap identified within the evaluated pharmacist intervention in RACF literature and has extended use of the CWR model into the RACF health care setting.

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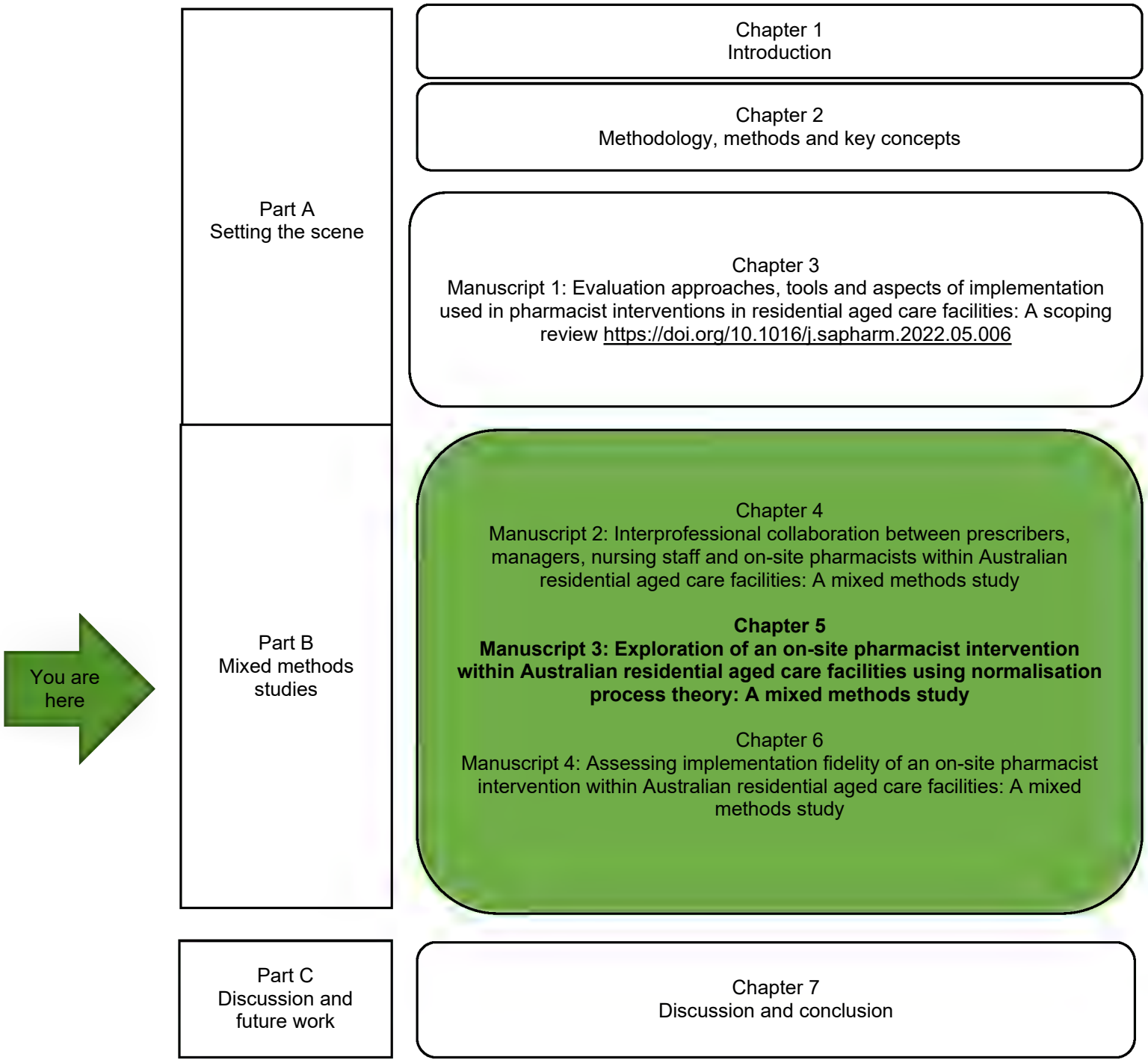
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Chapter 5
Manuscript 3: Exploration of an on-site pharmacist intervention within Australian residential aged care facilities using normalisation process theory: A mixed methods study

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Declaration for Thesis Chapter 5

Declaration by candidate

In the case of Chapter 5, the nature and extent of my contribution to the work was the following:

Nature of Contribution	Extent of Contributions (%)
Miranda Batten was the lead author of the manuscript, designed the study, undertook quantitative and qualitative data collection, analysis and interpretation, wrote and submitted the manuscript	80%

The following co-authors contributed to the work:

Name	Nature of Contribution	Contributor is also a UC student (Yes/No)
Sam Kosari	Research supervision, assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Joanne Lewis	Research supervision, assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Mark Naunton	Research supervision, assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Karen Strickland	Assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N

Miranda Batten

Candidate's Signature

24_/_10_/_2022_

Date

Declaration by co-authors

The undersigned hereby certify that:

(13) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.

(14) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

(15) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

(16) there are no other authors of the publication according to these criteria;

(17)potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(18)the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

[Please note that the location(s) must be institutional in nature, and should be indicated here as a department, centre or institute, with specific campus identification where relevant.]

Location(s):	Health Research Institute, University of Canberra

Signatures	Date
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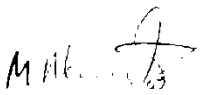
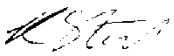
	31/10/2022
	31/10/2022

5.1 Introduction to manuscript

Normalisation process theory (NPT) is a 'mid-range' theory that offers a structure to understand the processes whereby a new practice becomes integrated into usual practice (May et al., 2007). NPT consists of four domains of work (coherence, cognitive participation, collective action, and reflective monitoring) (May et al., 2007). This theory can be employed in evaluation, feasibility and implementation studies (Huddlestone et al., 2020; Hughes et al., 2020; McEvoy et al., 2014; Segrott et al., 2017). Moreover, it has recently been used in real-world RACF studies (Bond et al., 2020; Hughes et al., 2020; Richter et al., 2022). Using NPT to guide evaluation of the OSP also addresses a potential gap identified in the scoping review reported in Part A (Chapter 3).

The objectives of this study were to evaluate the extent of OSP normalisation i.e. OSPs becoming part of routine practice, and understand how OSPs were normalised (or not) within the seven intervention RACFs.

5.2 Manuscript

This manuscript is currently under review for publication with Health and Social Care in the Community.

5.3 Abstract

Residents living in residential aged care facilities (RACFs) continue to experience medication related harm. There is ongoing interest in expanding the role of pharmacists, including on-site pharmacists (OSPs), to help improve medication management in RACFs. The objectives of this mixed methods study were to explore the extent and ways in which on-site pharmacists (OSPs) were normalised within RACFs as part of a complex intervention seeking to improve medication management. This study consisted of semi-structured interviews informed by Normalisation Process Theory (NPT) and a quantitative survey adapted from the Normalisation Measure Development questionnaire (NoMAD) instrument which is underpinned by NPT. Semi-structured interviews with prescribers, RACF managers, RACF nursing staff, OSPs, residents and family members (n=47) indicated that most participants supported OSPs within RACFs, that having OSPs in RACFs made sense, were perceived as beneficial and that participants were invested in working with OSPs who often became part of routine practice i.e.,

'normalised'. Prescribers, RACF managers and nursing staff (health care team members) completed the adapted survey and their responses (n=16) strongly complemented the positive qualitative findings. Overall, OSPs were positively appraised by health care team members as well as residents and family members and were generally considered to be normalised within their respective RACFs. This study explored the normalisation of OSPs within RACFs. From the perspective of residents, family members, health care team members and OSPs, OSPs could become part of routine practice within Australian RACFs. The findings of this study also highlighted the value of using theory to guide evaluation of a pharmacist intervention in RACFs and the utility of applying NPT in a new setting, Australian RACFs. Importantly, the findings of this study could help inform the future role of OSPs working and the roll out of OSPs within Australian RACFs.

5.4 Introduction

Medication related harm remains an ongoing problem for residents living in residential aged care facilities (RACFs) [1,2]. It is well established that residents living in RACFs are at high risk of, and more likely to experience medication related harm arising from high rates of inappropriate medication use [3] which can lead to unplanned hospital admissions and higher health care costs [1,4]. This problem may be partially attributed to the complex nature of medication management processes within RACFs [5]. While General Practitioners (GPs) coordinate the health care of residents, complexity exists as multiple health care professionals (specialist palliative care, geriatricians and other specialists), RACF staff (registered nurses) and allied health professionals (pharmacists) are involved in the prescribing, dispensing, administration and supply of medications to residents living in RACFs [6]. In addition, healthcare system, facility and/or health professional level factors may also impact medication management within RACFs, including but not limited to information communicated at care transitions and irregular resident medication reconciliation and review upon returning to RACFs e.g. from hospital or at RACF admission [6].

To address the multi-factorial nature of RACF medication management processes, complex health interventions are required. A 'complex intervention' is characterised as an intervention with numerous components which interact with each other to contribute to intended outcomes [7]. To ensure positive patient outcomes it is essential that complex health interventions be

evaluated. Quality evaluation of complex interventions can support the dissemination and adoption of evidence-based interventions in the real-world [8].

The *Pharmacists in Residential Aged Care Facilities* (PiRACF) study was a cluster randomised controlled trial which investigated whether OSPs directly employed part-time by RACFs could improve medication management [9]. The OSP intervention was complex given its focus on improving medication management at both the resident and RACF level requiring collaboration and communication with multiple stakeholders, thereby also supporting resident centred care.

In a recent scoping review we highlighted that the use of theory to frame evaluations of pharmacist interventions in RACFs is sparse [10]. This is despite some evidence that public health interventions underpinned by theory are more likely to demonstrate positive health outcomes [11]. Nested within the PiRACF study, this mixed methods study used Normalisation Process Theory (NPT) to explore whether and how having OSPs in RACFs became part of routine practice i.e. 'normalised' in Australian RACFs.

NPT was considered suitable for this study *a priori* given that it can provide an understanding of how new practices in health and other settings can become normal practice, at both the individual and collective level [12]. NPT has been employed in implementation, feasibility and process evaluation studies to evaluate complex interventions across various settings [12-14]. NPT has also been previously utilised in complex intervention studies undertaken in RACFs [15-17]. NPT consists of four constructs (coherence, cognitive participation, collective action and reflexive monitoring) [18] with further descriptions of each construct described in Table 5. More recently, a 23-item Normalisation Measure Development questionnaire (NoMAD) instrument was developed, based upon the four NPT constructs, which has demonstrated good construct validity and face validity [19].

This topic is important because the OSP role is relatively new and gaining an understanding of the workability and integration of OSPs within RACFs could help inform the anticipated roll out of OSPs within Australian RACFs commencing from 2023 [20]. An underlying premise of NPT is that if a complex intervention is fully workable and is integrated entirely into routine practice, this will support the overall success of the intervention [21]. Thus, if OSPs are considered as part of routine practice, this would increase the likelihood of their impact on improving medication management within RACFs. To date, there is sparse literature available on the

workability and integration of OSPs within RACFs in Australia and internationally. This study addresses this research gap and moreover, it has helped to identify future OSP research studies as well as policy and practice implications which could inform OSP roll out within Australian RACFs.

The aims of this study were to understand the extent to which OSPs became part of routine practice i.e. 'normalised' and how OSPs were normalised (or not) within these RACFs from the perspectives of residents, family members, OSPs and health care team members (specifically prescribers, managers and nursing staff).

5.5 Methods

This study employed an embedded mixed methods study design. A qualitative dominant approach was taken with a smaller quantitative component to enhance this study's methodology [22,23]. An important element of reducing medication related harm relates to collaboration between GPs, RACF nursing staff and pharmacists [24]. As such, the perspectives of these health care professionals were sought in this study. Consistent with other pharmacist interventions in RACF studies the manager perspective was also sought [16,25]. Resident and family member insights were sought as their end-user perspective is an important evaluation component when assessing care provision [26].

Use of an adapted survey based upon the NoMAD instrument was also consistent with the approach taken by the Care Home Independent Prescribing Pharmacist Study (CHIPPS) study team where their process evaluation study protocol included use of the NoMAD instrument [27]. Given the objectives of this mixed methods qualitative dominant study, survey data reliability and construct validity tests were not planned *a priori* nor undertaken for this study. However, for this study, the adapted survey was piloted by a prescriber and nurse who provided feedback to help establish face validity.

For this study, data were collected from semi-structured interviews and an adapted survey from April 2021 to January 2022. A prescriber and nurse also piloted the interview guide to establish face validity. A family member of a resident living in a RACF additionally piloted the interview guide. For the purposes of this study, specific interview questions were underpinned by NPT as well as seeking insights for the PiRACF study evaluation. A range of stakeholder

perspectives were obtained using a purposive (stratified) sample approach[28]. Health care team members (prescribers, RACF managers and nursing staff), OSPs, residents and family members were invited to participate in the semi-structured interviews.

Health care team members were invited to complete the adapted survey, informed by the NoMAD instrument to obtain their individual and collective perspectives. It was estimated that the total number of prescribers, RACF managers and nursing staff in the seven RACFs would be approximately 127 given available RACF staffing data. The estimated survey sample size required was 46 noting previous mixed methods studies which have employed the NoMAD instrument with a mean response rate of 36% [29,30].

Data collection

For the health care team member interviews and surveys, RACF managers facilitated email recruitment. Email reminders and individual invitations were also sent to prescribers, RACF staff and OSPs. Hard copy surveys and locked survey box were distributed to RACFs to facilitate survey completion.

For the resident and family member interviews, OSPs and/or RACF managers contacted those who had interacted with the RACF OSPs. Only participants with capacity to consent were eligible to be interviewed. Residents and family members were provided a $20 gift card for their involvement.

The lead author (MB) conducted audio-recorded interviews. These interviews were transcribed, checked and deidentified to ensure participant anonymity and confidentiality [31].

Data analysis and reporting

Ritchie and Spencer's framework analysis approach was used to analyse the qualitative data[32]. This approach consists of the following steps: (1) Familiarisation; (2) Constructing a thematic framework; (3) Indexing; (4) Charting; (5) Mapping and interpretation [32]. This approach was chosen in recognition of the anticipated large volume of qualitative data associated with this study [33]. The qualitative data was deductively coded and analysed based upon the NPT constructs. Regular ongoing discussions with co-authors informed the developed of an initial

coding framework, along with analysis and interpretation of the data [34]. NVivo was utilised to aid in data management and maintaining a clear audit trail[35].

All quantitative data (inclusive of hard copy survey results entered by the study team) were downloaded from Qualtrics and cleaned in Microsoft Excel. Consistent with Lewis et al.'s mixed methods study which employed the NoMAD instrument, survey responses for this study were described and summarised at the group level [30].

The qualitative data in this study was reported according to the Consolidated Criteria for Reporting Qualitative Research checklist [36]. The mixed methods data were integrated at the interpretation stage [37], with qualitative findings reported followed by quantitative and integrated data findings, consistent with the qualitative dominant approach of this study. This mixed methods study is also reported according to Hadi et al.'s recommendations to improve mixed methods research reporting for pharmacy practice researchers [38].

The Human Research Ethics Committees at University of Canberra (HREC-2007), ACT Health (2019/ETH13453) and Calvary Public Hospital Bruce (30-2019) approved this study. Written consent from participants was obtained prior to interviews and survey commencement.

5.6 Results

Forty-seven interviews were undertaken with General Practitioners (n=7), Nurse Practitioners (n=2), RACF managers (n=7), RACF Registered Nurses (n=9), RACF Enrolled Nurse (n=1), OSPs (n=7 interviews with 6 OSPs [one OSP worked across two RACFs]), residents (n= 10), family members (n=4) from seven RACFs participating in the PiRACF study. Interview length ranged from 14 minutes to 163 minutes. The median duration of interviews for health care team members, residents and family members was 38 minutes. The OSP interview median duration was 148 minutes. Semi-structured interview participant characteristics are described in Table 6.

Sixteen completed surveys (n=16) were returned from 10 RACF nursing staff, 3 RACF managers and 3 prescribers, with a survey response rate of 13%. It is anticipated that a contributing factor to the low survey response may have been the ACT COVID-19 lockdown which commenced from August 2021 which resulted in an increased workload for health care professionals, including RACF staff [39]. Given the objectives of this mixed methods qualitative

dominant study, further quantitative tests or post-estimates were not planned *a priori* nor undertaken for this study.

The adapted survey findings are displayed in Table 7. The qualitative, quantitative and integrated findings for this study have been reported according to the NPT constructs.

Coherence

Overall, most participants interviewed considered that having the OSP at their respective RACF was different to usual practice and was beneficial, particularly with regards to the provision of more timely medication related information for residents and family members.

The qualitative findings suggested that most participants across the seven RACFs agreed that OSPs working within their respective RACFs differed from usual practice. Some residents and family members across the RACFs considered that the OSP was more available compared to RACF staff and visiting GPs (usual practice). As described by one resident, who valued knowing what medications they were being prescribed, their GP '*combined one particular tablet with another particular tablet. [The GP] didn't tell me what the name of it was… But [the OSP] found out [as I asked the OSP, otherwise] I would've wait[ed] 'til my next appointment which is in June [three months later] with that particular doctor… [to ask] "What have you done? What is it?"'* [R3.1]. This quote illustrates that having the OSP at that RACF resulted in the resident knowing what medications they were taking in a more timely manner as compared to usual practice.

Additionally, one manager described a reduction in management complaints at their RACF, namely that '*it's really gone from you know six or seven [complaints] in a month to zero'* [M6.1], which the RACF manager considered was a *'a big reflection'* [M6.1] of having the OSP at their RACF. This RACF manager indicated that by *'having OSP here onsite… we can give the [requested medication] information straightaway to the family instead of them stewing for a week while we're trying to gather the information'* [M6.1]. This was then contrasted with usual practice wherein a registered nurse sometimes *'spent hours trying to find that [medication] information'* [M6.1] and instances where family members were not satisfied with the medication information provided *'because it's not quite what they're after'* [M6.1] resulting

in *'quite a lot of complaints about medication, why they are put on this, "I'm not getting the correct information," that type of thing'* [M6.1].

Another powerful example of how having OSPs in RACFs differed to usual practice was during family member admission into a RACF. One family member described this as a time '*full of misgivings… You always think you'd done the wrong thing. You think of how others are judging you'* [FM3.1]. This family member considered that this time was *'such a crucial time for a pharmacist to be here when someone, a loved one, has just been placed into care and changes are being made to medication'* [FM3.1]. Usual practice, without the OSP, would have meant that this family member would not have had access to a pharmacist on-site to talk to about '*the medication side of things'* [FM3.1].

Most health care team members at both the individual and team level described the OSP's role as beneficial. According to one manager, it was beneficial that their OSP was *'able to take a long term interest in residents and follow up medication related matters for them over many weeks and months'* [M5.1]. This continuity and its value were also mentioned by two OSPs culminating in some OSPs being able to have a deeper understanding of the resident and sometimes being able to *'build a really good history and a relationship with them'* [OSP 1] through ongoing interactions. Two prescribers did not consider that the OSP was beneficial within the context of their respective RACFs. One of these prescribers acknowledged that the OSP could have added value for less experienced prescribers and the other prescriber indicated their full support of OSPs in RACF but that they did not have a working relationship with that particular OSP as they only communicated with each other electronically on medication related matters.

Most health care team member survey respondents positively reported on the adapted survey questions which related to the NPT coherence construct. In particular, all survey respondents (100%, n=16) considered that they saw the potential beneficial impact of the OSPs at their RACF. The quantitative findings indicated that having the OSP made sense to health care team member survey respondents. The qualitative findings tended to suggest that most participants perceived that having the OSP in their respective RACF was beneficial. The positive quantitative findings strongly complement these findings from the health care team member perspective.

Cognitive participation

Overall, participants interviewed were positively invested in having the OSP at their respective RACF with managers often key people helping to drive normalisation of OSPs within RACFs. Health care team members across the seven RACFs also tended to perceive that working with OSPs was now part of their usual role.

OSPs interviewed indicated that their managers were often key people to help drive having the OSP to become part of routine practice. One OSP indicated that '*The general manager introduced me and said, "This is our onsite pharmacist. We're so happy and lucky to have her here. We wanna make the most of having [the OSP] here, and please involve [the OSP] in stuff,"'* [OSP 1]. This OSP considered that their manager was key to helping drive RACF staff to realise and accept that the OSP was to be '*integrated into their systems'* [OSP 1].

Across the seven RACFs, most health care team members interviewed considered that working with the OSP was a legitimate part of their role and were invested in working with the OSP. However, they were more likely to work collaboratively with the OSP after the OSP established a trusted relationship with them. As described by one OSP, establishing these relationships was *'the foundation for anything else'* [OSP 6] they did within the RACF. This then helped increase the likelihood of prescribers, listening to them and being *'far more likely to act'* [OSP 6] when medication recommendations were made. This is mirrored by a prescriber who indicated an openness to medication recommendations made by the OSP, *'Obviously if [OSP 1] made recommendations, it would be very sensible for me to listen to them and generally and act on them'* [GP1.2].

Health care team member survey respondents positively reported on the adapted survey questions which focussed on the NPT cognitive participation construct. All survey respondents (100%, n=16) considered that they were open to working collaboratively with their OSP and would continue to support their OSP. These quantitative findings suggested that there were high levels of investment amongst survey respondents. The qualitative findings which indicated that there was good investment in having OSPs in their respective RACFs, are reinforced by the positive health care team member survey findings.

Collective action

Most health care team members interviewed had varying perspectives on the OSP's impact on their respective workloads, but the majority considered that it was easy for them to work with OSPs. Furthermore, the qualitative findings suggested that OSPs were more likely to enhance as opposed to disrupt existing relationships.

Most managers and nursing staff considered that having the OSP undertaking medication management activities reduced their workload. As described by a nurse, the *'workload for us will be crazy now that OSP 1 is leaving'* [RN1.1]. There were however divergent views of the OSPs impact on prescriber workload ranging from a noticeable reduction in workload and '*shorten*[ing] *our time spent onsite'* [GP1.1] through to contributing to a slight increase '*because OSP 6 will be scrutinising a lot of the medication, a lot more than I would'* [GP 6.1]. These varying views were not unexpected given the OSP's focus on medication management, including more medication reviews and audits of high risk medications compared to usual practice.

Most health care team members seemed to find it easy to integrate the new way of working with the OSP into routine practice. Nursing staff consistently found it *'quite easy to adapt'* [RN4.1] to having OSPs at their respective RACFs. Likewise, a manager described how *'we just worked together and I can't see any of it being difficult'* [M1.1] reflective of the ease of OSP normalisation at that RACF. Some GPs also considered that it was easy to integrate working with the OSP, as illustrated by this quote, *'I think it just happened. I don't think we tried to engineer it'* [GP1.2] when describing how they worked with an OSP. As we might expect, the time it took for health care team members to integrate working with OSPs varied across RACFs. However, overall, at time of interview, most health care team members seemed to consider that the OSP at their respective RACF had become part of their team.

Participants interviewed did not appear to perceive that OSPs disrupted any existing relationships. Instead, examples were provided wherein the OSP was seen as facilitating communication amongst health care team members. One nurse indicated that *'when OSP 5 is there… we ask [the OSP] to, you know, "Can you please help us talk to the GP?"... having [the OSP] there, it's very easy to interact with [the GP] because you've got that extra support'*

[RN5.1]. That is, the OSP sometimes helped nursing staff to have improved interactions with prescribers within RACFs.

Health care team member survey respondents positively reported on the adapted survey questions relating to the NPT collective action construct. Most survey respondents (94%, n=15) strongly agreed that it was easy to integrate working with the OSP into their existing work and that OSPs were adequately supported by management. Importantly, a high proportion of survey respondents either strongly disagreed (50%, n=8) or disagreed (38%, n=6) that the OSPs disrupted existing relationships. As with the previous NPT constructs, the qualitative findings appear to be complemented by the positive quantitative findings.

Reflexive monitoring

Overall, the qualitative findings indicated that most participants considered that OSPs were worthwhile and valued across the seven RACFs. Furthermore, residents, family members, nursing staff and managers were able to describe examples where the OSP was able to provide specific medication management support. The ongoing worth and value of OSPs was actively demonstrated by two RACFs continuing to self-fund their OSPs once the PiRACF study concluded.

Most residents and family members considered that OSPs were accepted with *'everybody know[ing] who [the OSP] is. [The OSP]'s not on the outside looking in'* [R3.1]. Residents and family members who had regular interactions with OSPs were the most supportive of OSPs. Health care team members interviewed were also broadly supportive of OSPs in RACFs as articulated by one manager stating that they felt that the OSP was *'invaluable'* [M4.1]. While five managers mentioned lack of funding as a barrier to having OSPs continuing beyond the trial, two RACFs elected to continue self-funding the part-time OSPs within their respective RACFs.

One potentially invaluable role of OSPs related to how some family member considered that the OSPs provided a 'broker' role within the RACF. One family member described how the OSP *'had an in to the role of the RN, the role of the doctors, [the OSP] had access to these people'* [FM3.1]. This family member perceived that as the OSP *'knew about them. [The OSP] knew their roles, what the full nature of their roles'* which meant that '*I just felt that [the OSP]*

was able to often tell me, 'Look, check [with] so and so'' [FM3.1]. For this family member, it seemed that the OSP made it easier for them to navigate and connect with relevant health care team members to facilitate the provision of quality care to their family member.

When reflecting on this complex intervention, residents and family members described examples where the OSP's impact was valued. For instance, one family member described the importance of speaking with the OSP which helped to increase their medication knowledge thereby becoming more empowered to have *'proper discussions with doctors and my husband's specialists'* [FM 3.1]. That is, discussions with an OSP helped this family member to feel *'more confident to have those [medication management decision-making] discussions [with doctors and specialists] and know what sorts of questions I need to ask and know what I should be aiming for'* [FM 3.1]. This sentiment is echoed by a manager who considered that '*we've gone from residents who have just left everything in our hands to them actually questioning the doctors, "Why do I need this?"'* [M6.1]. That is, some OSPs were able to help empower residents, at times, thereby helping to give *'them back control [over] their own medications'* [M6.1]. However, to be expected, this perspective was not universal with a family member at a different RACF describing conversations with the OSP about potential medication changes for their family member as *'it's all pretty much gobbledygook to me. They explain the different drugs and that, I but I don't know what they are'* [FM1.1]. Instead, this family member relied upon '*the fact that mum is happy and she had no incidents and everything is going well'* [FM1.1] when it came to accepting suggested medication changes.

When reflecting upon where the OSP's impact was valued, a nurse described that the OSP '*helped us with the psychotropic register a lot. So I feel like if [the OSP] wasn't there, it would have taken us a lot of time and a lot of manpower to do that, but having [the OSP] there, it really helped us getting things on track'* [RN 5.1]. That is, the OSP undertook activities which could be used to support medication management in the future.

Health care team member survey respondents positively reported on the adapted survey questions relating to the NPT reflexive monitoring construct. All survey respondents (100%, n=16) strongly agreed that they valued the OSP's impact and most survey respondents (75%, n=12) strongly agreed that they and their colleagues believed that working with the OSP was worthwhile. These quantitative findings illustrate that health care team member survey respondents positively appraised having OSPs at their respective RACFs. These quantitative

findings reaffirm the qualitative findings which suggested that residents, family members and health care team members positively perceived OSPs within RACFs.

5.7 Discussion

This mixed methods study explored the extent of OSP normalisation and how OSPs were normalised within the context of the PiRACF study. The qualitative findings indicated that overall OSPs within RACFs made sense, with generally good levels of investment and support for OSP normalisation across the RACFs. Overall, having OSPs within RACFs were positively perceived by health care team members, residents and family members. These positive findings were complemented by the positive quantitative study findings which was reflective of health care team member survey responses. This study's findings demonstrated that OSPs can be normalised within Australian RACFs and illustrated some important insights which could help inform the future role of OSPs working within Australian RACFs.

The positive appraisal of OSPs by health care team members, residents and family members was informed by the perception that OSPs were able to assist in reducing nursing, manager and some prescriber workloads, that OSPs were easy to integrate into existing work and that OSPs added value and were (or could be) beneficial within RACFs. By contrast, a qualitative study using NPT conducted within a German RACF identified that barriers to implementing their complex intervention, which sought to reduce antipsychotic prescribing, related to staff experiencing higher workloads due to their intervention along with uncertainty about that intervention's feasibility and impact [15]. It is possible that those barriers were not identified in this study due to a range of varying intervention and contextual factors, in particular, having OSPs within RACFs in the PiRACF study context.

Consistent with a mixed methods study conducted within an Australian operating room department which utilised the NoMAD instrument[29], health care team member survey respondents in this study were also positive with regards to the value, ease of integration and support of the intervention i.e. having OSPs at their respective RACFs. Similar to a qualitative study conducted in Australian primary health care which was underpinned by NPT [40], this study also identified funding as a perceived barrier to intervention continuation. It is anticipated that this barrier will be addressed, to some extent, through anticipated Australian Government funding to expand the role of pharmacists, inclusive of OSPs, in RACFs from January 2023. It

is suggested that future OSP studies could consider survey data reliability and validity testing and include further in-depth data analysis of survey data results. Future research on the sustainability of OSP normalisation within RACFs in other geographical and socio-economic settings may also be beneficial.

Some previous NPT studies have tended to focus on the perspective of health care professionals with limited exploration of resident and family perspectives in studies which have employed NPT [13]. Informed by the literature [13,27], this study incorporated insights from multiple stakeholders, including residents and family members, to understand OSP normalisation from a system wide as opposed to a professionally focussed perspective. A contribution of this study is that the qualitative findings yielded important insights from the perspectives of residents and family members, particularly with respect to OSPs potentially providing a 'broker' role and empowering residents and family members in relation to medication management decision-making.

A novel finding of this study was that some family members perceived that the OSP could assist them to connect and communicate more effectively with health care team members. As such, it appeared that some OSPs were able to act as a 'broker' to support increased communication and connection so that these family members were supported to navigate care for their loved one within their respective RACFs [41]. While the potential role of pharmacists in a 'knowledge broker' role as part of the Evidence-based Medication knowledge Brokers in Residential Aged CarE study currently underway includes facilitating collaboration between all stakeholders in medication management [42], the findings of this study shed light into the potential role of OSPs to explicitly support residents and family members in a new and novel way. Ongoing exploration of this potential 'broker' role provided by OSPs within Australian RACFs is strongly encouraged.

Previous studies conducted in Northern Ireland and Malaysia have identified that residents living in RACFs are seldom empowered with respect to medication management [43,44]. Residents who are not empowered may be described as passively accepting care provided by health care team members and not questioning any aspects of the care provided [44]. A necessary pre-requisite to empowered residents and family members would likely include good levels of health literacy. Health literacy can be defined as individuals having the necessary skills, knowledge and motivation to access, understand and apply health information when making

decisions about their (or their family member's) care [45]. Additionally, discussions between health care professionals, residents and family members about medications, particularly during transitions of care e.g. admission to a RACF, is an important mechanism to support residents and family members to have the necessary information to make informed medication management decisions [46].

The qualitative findings of this study suggested that some OSPs were able to increase the medication knowledge of and empower some residents and family members with regards to medication management decision-making by being on-site and discussing medication related matters with them. While not all residents and family members may wish to increase their medication knowledge and discuss specific medication related matters, these opportunities should nevertheless be available. The findings of this study have real-world implications given that residents and family members with higher levels of medication knowledge (and health literacy) are more likely to be empowered. More empowered residents and family members are then more likely to be actively involved in medication related discussions, ask questions and initiate conversations (such as deprescribing conversations) [47] thereby increasing their capacity to make well informed medication management decisions. Further exploration of how OSPs within Australian RACFs can support resident and family member health literacy, as well as empowering resident and family members to participate in medication discussions and make informed medication management decisions, particularly during transitions of care, should be considered.

This study provided unique insights into the extent of OSP normalisation and how OSPs were normalised from the perspective of residents, family members, health care team members and OSPs in RACFs. This study builds upon the previous literature which has employed NPT to explore complex interventions within RACFs[15,16]. It also demonstrated the viability of evaluating a pharmacist intervention within Australian RACFs through the lens of NPT. Critically, this study helped to address a potential gap identified in the evaluated pharmacist intervention in RACF literature wherein there is sparse utilisation of theory to help guide evaluation.

The limitations of this study related to its limited generalisability, low survey response rate, as well as the possibility that health care team member interview participants may not have been survey respondents and vice versa. Additionally, the perspectives of care staff and allied health

professionals were not obtained in this study. A final limitation was that this study was designed and conducted prior to the publication of a recently developed coding NPT qualitative coding manual which includes guidance on how to map NPT findings to the realist evaluation Context-Mechanism-Outcome configuration [18]. Future OSP research could benefit from use of this qualitative coding manual. Key strengths of this study were its use of mixed methods design and incorporation of multiple stakeholder perspectives, including those of residents and family members.

5.8 Conclusion

This study provided insights into the extent of OSP normalisation and how OSPs were normalised within Australians RACFs from the perspectives of prescribers, RACF managers, RACF nursing staff, OSPs, residents and family members. This study demonstrated that OSPs were generally positively appraised and could be normalised (i.e. become part of routine practice) in real world RACFs. This study has policy and practice implications for the roll out of the relatively new OSP role within Australian RACFs, particularly in relation to the potential role of OSPs to provide a potential 'broker' role and increase resident and family member knowledge and empowerment with regards to medication management decisions-making. Furthermore, this study has identified future OSP research directions, particularly in relation to the sustainability of OSP normalisation and illustrated the value of using theory to guide evaluation of a pharmacist intervention in RACFs.

Conflicts of interest

Nil.

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5.9 References

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Table 5: Definition of each NPT construct

NPT Construct	Definition
Coherence	The first NPT construct of coherence (making sense of the intervention) relates to how participants make sense of the intervention at the individual and team level. Making sense of the intervention includes having an understanding of how the new practice compares to usual practice and the perceived value of the new practice [24]
Cognitive participation	The second NPT construct of cognitive participation (investment in the intervention) relates to the engagement of participants in operationalising the new practice. Investment in the intervention includes key people driving the new practice, perceiving the intervention as being a legitimate part of their new practice, as well as being willing to adopt the new practice [24]
Collective action	The third NPT construct of collective action (enacting the intervention) relates to the work which participants undertake to operationalise a new practice. Enactment of the intervention includes the ease of intervention integration into existing work, the impact on working relationships, confidence of others participating and adequate management support of the new practice [24]
Reflexive monitoring	The fourth NPT construct of reflexive monitoring (appraising the intervention) relates to the work which participants undertake when assessing a new practice at the individual and team level. Appraisal of the intervention includes awareness of the new practice, perception of the new practice's impact, potential to modify work to incorporate the new practice and support future improvements [24]

Table 6: Semi-structured interview participant details

Participant group	Number of participants	Age (years) range and mean ± SD	Gender
Resident	10	≤ 85 (5, 50%) > 85 (5, 50%) 83.5 ± 7.17	F (7, 70%) M (3, 30%)
Family member	4	≤ 70 (2, 50%) > 70 (2, 50%) 89.5 ± 6.81	F (3, 75%) M (1, 25%)
On-site pharmacist	6	≤ 40 (4, 67%) > 40 (2, 33%)† 37.7 ± 5.99	F (5, 83%) M (1, 17%)†
RACF manager	7	≤ 50 (2, 25%) > 50 (6, 75%)‡ 51.6 ± 9.11	F (6, 75%) M (2, 25%)‡
Nursing staff	10	≤ 40 (5, 50%) > 40 (5, 50%) 43.1 ± 17.61	F (10, 100%)
Prescriber	9	≤ 40 (1, 12.5%) > 40 (7, 87.5%)§ 51.6 ± 10.66	F (4, 50%) M (4, 50%)§

† 7 interviews were conducted with 6 OSPs; one OSP worked across two RACFs and was therefore interviewed twice

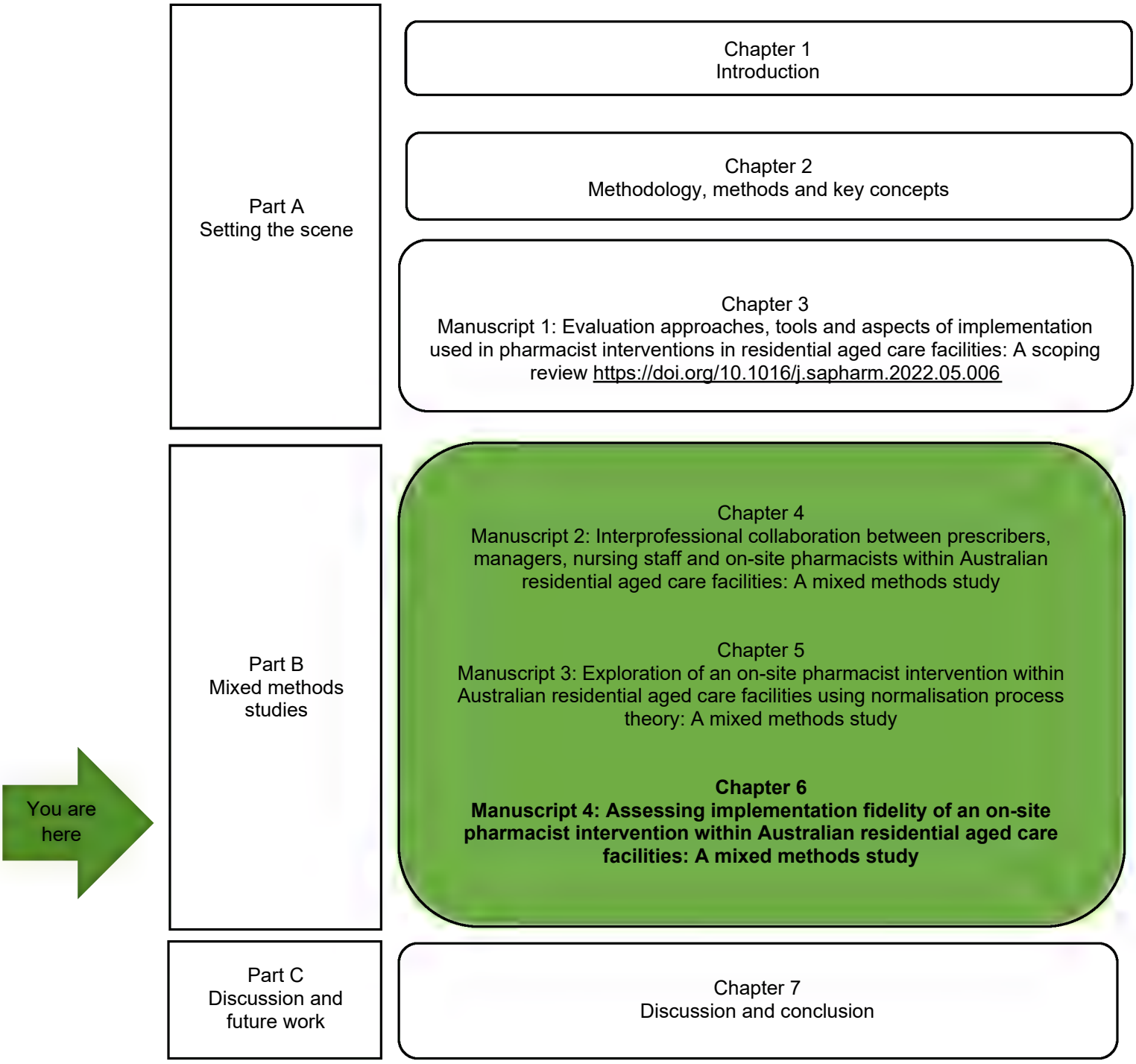
‡ includes characteristics of RACF manager who in lieu of an interview provided written feedback

§ does not include characteristics of GP who was interviewed but elected not to disclose their characteristics

Table 7: Survey results (format adapted from Lewis et al. 2019)

Survey questions	N	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Coherence I can see how having the on-site pharmacist at this facility differs from not having an on-site pharmacist	16	0	0	0	1	15
My colleagues (e.g. RACF staff, visiting General Practitioners) and I have a shared understanding of the on-site pharmacist's purpose at this facility	16	0	0	0	3	13
I understand how the on-site pharmacist's role affects my work	16	0	0	0	2	14
I can see the potential beneficial impact of having the on-site pharmacist at this facility	16	0	0	0	0	16
Cognitive Participation There are key people who drive working alongside the on-site pharmacist at this facility and get others involved	16	0	0	0	3	13
I believe that working with the on-site pharmacist is a legitimate part of my role	16	0	0	0	2	14
I am open to working collaboratively with the on-site pharmacist at this facility	16	0	0	0	0	16
I will continue to support the on-site pharmacist working at this facility	16	0	0	0	0	16
Collective Action I can easily integrate working with the on-site pharmacist into my work	16	0	0	0	1	15
The on-site pharmacist disrupts existing relationships (item score reversed)	16	8	6	1	0	1
I have confidence in my colleagues' ability to work with the on-site pharmacist	16	0	0	0	4	12
Facility management adequately supports the on-site pharmacist	16	0	0	0	1	15
Reflexive Monitoring I am aware of reports about the work undertaken by the on-site pharmacist	16	0	0	1	2	13
My colleagues and I believe that having the on-site pharmacist working at this facility is worthwhile	16	0	0	0	4	12
Residents believe that having the on-site pharmacist working at this facility is worthwhile	16	0	0	2	5	9
I value the on-site pharmacist's impact at this facility	16	0	0	0	0	16
I can modify how I work with the on-site pharmacist to improve resident care which relates to medications	16	0	0	0	0	16
Feedback about the activities undertaken by the on-site pharmacist can be used to improve resident medication care in the future	16	0	0	0	0	16

Note: N = total number of responses to each survey question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Chapter 6
Manuscript 4: Assessing implementation fidelity of an on-site pharmacist intervention within Australian residential aged care facilities: A mixed methods study

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Under review for publication with BMC Health Services Research

Declaration for Thesis Chapter 6

Declaration by candidate

In the case of Chapter 6, the nature and extent of my contribution to the work was the following:

Nature of Contribution	Extent of Contributions (%)
Miranda Batten was the lead author of the manuscript, designed the study, undertook qualitative data collection, analysis and interpretation, undertook quantitative data analysis and interpretation, wrote and submitted the manuscript	70%

The following co-authors contributed to the work:

Name	Nature of Contribution	Contributor is also a UC student (Yes/No)
Jane Koerner	Assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Sam Kosari	Research supervision, assisted with study design, conducted medication review appropriateness checks, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Joanne Lewis	Research supervision, assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Mark Naunton	Research supervision, assisted with study design, conducted medication review appropriateness checks, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N
Karen Strickland	Assisted with study design, assisted with data analysis and interpretation, assisted in reviewing and editing the manuscript	N

Candidate's Signature

30__11_/__2022__
Date

Declaration by co-authors

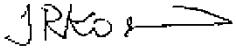
The undersigned hereby certify that:

(19) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.

(20)they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
(21)they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
(22)there are no other authors of the publication according to these criteria;
(23)potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
(24)the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

[Please note that the location(s) must be institutional in nature, and should be indicated here as a department, centre or institute, with specific campus identification where relevant.]

Location(s):	Health Research Institute, University of Canberra

Signatures	Date
	5/12/2022
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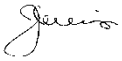	30/11/2022
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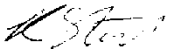	30/11/2022

6.1 Introduction to manuscript

Implementation fidelity is the term used to describe the extent to which an intervention was implemented as intended (Carroll et al., 2007). In the past, implementation fidelity has been seldom assessed (Batten et al., 2022; McMahon et al., 2015; Slaughter et al., 2015). Encouragingly, this appears to be changing within the pharmacist intervention in RACF literature and further afield (Bond et al., 2020; En-Nasery-de Heer et al., 2022; van der Laan et al., 2019; Willeboordse et al., 2018). Assessment of implementation fidelity is important given that if implementation fidelity is not measured, it is unclear whether an intervention's lack of effect is due to poor implementation (i.e. implementation failure) or an inadequately designed intervention (i.e. theory failure) (van der Laan et al., 2019; Willeboordse et al., 2018). Assessing implementation fidelity of the OSP intervention addresses a potential gap identified in the scoping review reported in Part A (Chapter 1).

The objectives of this study were to assess the implementation fidelity of OSP intervention delivery and determine the moderating factors which may have influenced delivery of this intervention.

6.2 Publication

This manuscript is currently under review for publication with BMC Health Services Research.

6.3 Abstract

Background: An on-site pharmacist (OSP) intervention was implemented which sought to improve medication management within residential aged care facilities (RACFs) in the Australian Capital Territory, Australia. The objectives of this mixed methods study were to evaluate the implementation fidelity of the OSP intervention and to determine the moderating factors which influenced delivery of this intervention.

Methods: This convergent parallel mixed methods study was underpinned by Hasson's conceptual framework for implementation fidelity. Implementation fidelity for 7 intervention RACFs was quantitatively assessed using 3 quantitative data sets: (1) range of OSP intervention activities delivered; (2) random sample of 10% of medication reviews assessed for quality; (3) proportion of residents who received at least one medication review. Semi-structured interviews

(n=14) with managers and OSPs across the intervention RACFs were conducted to identify moderating factors which may have influenced OSP intervention delivery.

Results: The OSP intervention was generally delivered as intended with overall medium levels of implementation fidelity. This delivery was supported by a range of facilitation strategies with most participants perceiving that the intervention was delivered to a high standard. RACF managers and OSPs were mostly well engaged and responsive. A number of potential barriers (including the part-time OSP role, COVID-19 pandemic, RACFs spread out over a large area with significant distance between resident dwellings) and facilitators (including the pharmacist support meetings, OSPs who took time to establish relationships, RACF managers who actively supported OSPs and worked with them) for OSP intervention delivery were identified which have potential implications for the roll out of OSPs within Australian RACFs.

Conclusion: In this study, the implementation fidelity of OSP intervention delivery was assessed with overall medium levels of fidelity found across the intervention RACFs. This suggested that the OSP intervention can generally be delivered as intended in real-world RACFs. OSP intervention delivery was influenced by a range of moderating factors, some of which posed barriers and others which facilitated the OSP intervention being delivered as intended.

6.4 Introduction

Background

Residents living in Residential Aged Care Facilities (RACFs) are at high risk of medication-related problems (1) which can lead to medication-related harm. Medication-related harm is the overarching term used to describe harm amongst patients caused by medication errors and unsafe medication practices ranging from prescribing of potentially inappropriate medication through to dispensing and administration errors (2). Internationally, inappropriate medication use impacts around 50% of residents living in RACFs (3) and it has been suggested that 95% of residents living in Australian RACFs have at least one-medication related problem (4). Residents living in RACFs are also more likely to be prescribed potentially inappropriate medications compared to older people living at home (5-7) which may increase their risk of experiencing medication-related harm.

The importance of improving medication management processes to reduce medication-related harm is illustrated by the introduction of medication management – polypharmacy and medication management – antipsychotic as new quality indicators by the Aged Care Quality and Safety Commission in 2021 (8). This means that medication management is recognised as an important quality of care aspect which has the potential to impact upon the health and wellbeing of residents living in Australian RACFs (8).

There have been ongoing efforts to improve medication management within Australian RACFs. A 2017 pilot study conducted in Canberra, Australian Capital Territory (ACT) identified some promising findings associated with having an on-site pharmacist (OSP) working in a RACF (9). Following on from this pilot study, in 2020, an OSP intervention was implemented as part of a cluster randomised controlled trial (RCT) in RACFs in Canberra, ACT (10). The Pharmacists in Residential Aged Care Facilities (PiRACF) study evaluated the effectiveness and implementation of a 12-month OSP intervention which sought to improve medication management.

Implementation fidelity is commonly described as the extent to which an intervention was delivered as intended (11). Implementation fidelity may be considered a core process evaluation component (12) or an aspect of implementation (13). Historically, implementation fidelity has been seldom assessed when evaluating pharmacist interventions in health care settings (13, 14) but has begun to change recently (15-19). Assessment of implementation fidelity can help inform whether the intervention's outcome was due to design issues (i.e. theory failure) or intervention delivery issues (i.e. implementation failure), thus supporting real-time intervention delivery modifications and adoption of the intervention (20).

This mixed methods study was conducted within the context of the PiRACF study to understand the extent to which the OSP intervention was delivered as intended and determine the factors which influenced this intervention delivery across the 7 intervention RACFs. This increased understanding has the potential to optimise the roll out of OSPs in Australian RACFs by determining whether the OSP intervention can be delivered as intended in real-world RACFs. The identification of potential barriers and facilitators to successful OSP intervention delivery is also timely given that the Australian Government will be funding OSPs in RACFs commencing from 2023 (21).

Aim

The aim of this study was to evaluate the implementation fidelity of the OSP intervention and understand the moderating factors which may have impacted delivery of the OSP intervention.

6.5 Methods

Study design

This study's focus on intervention delivery is consistent with Gearing et al.'s assertion that intervention delivery is a core aspect of implementation fidelity (22). The use of mixed methods study design for this study is consistent with previous health care implementation fidelity studies (17-19, 23-26). A convergent parallel design was employed in this study wherein the quantitative and qualitative data were collected and analysed separately and then merged and integrated (27, 28). This approach helps to offset any potential weaknesses associated with the individual data sets. The use of an existing implementation fidelity framework is also consistent with previous health care implementation fidelity studies (12, 17, 24, 29).

Hasson's conceptual framework for implementation fidelity

Implementation consists of adherence components (measurable) and moderating factors (non-measurable) which inform and can influence fidelity (11). For this study, Hasson's conceptual framework for implementation fidelity was used as it expands upon Carroll et al.'s seminal conceptual framework for implementation fidelity (11) by proposing the inclusion of context and recruitment as additional moderating factors (30). Please see Table 8 for further definitions of adherence and moderating factors within the implementation fidelity context. Hasson's conceptual framework has also been previously employed to assess the implementation fidelity of a pharmacist intervention (17).

Table 8: Implementation fidelity terms and definitions (adapted from Carroll et al., 2007 and Hasson, 2010)

Implementation fidelity terms	Definition
Adherence	The measure by which implementation fidelity is assessed. This measure determines whether the intervention was delivered as intended (11). The higher the fidelity, the greater extent to which the intervention was delivered as intended (11). Adherence measurements are quantifiable and comprise of the following subcategories – content, frequency, duration and coverage (11)

Moderating factors	A range of factors may impact the extent to which an intervention was implemented as intended (11). According to Hasson, the following moderating factors have the potential to positively or negatively influence fidelity – participant responsiveness, comprehensiveness of policy description i.e. intervention complexity, facilitation strategies, quality of delivery, recruitment and context (30). Participant responsiveness relates to how participants delivering as well as receiving the intervention perceive the intervention's relevance and are engaged with the intervention (11, 30). Intervention complexity relates to the description of the intervention (11) as well as the complexity of the intervention itself (30). Facilitation strategies relates to the strategies employed to standardise and optimise implementation fidelity (11). Quality of delivery relates to appropriate delivery of the intervention as intended (11). Recruitment relates to the processes supporting participants to participate in the intervention (30). Context relates to the structures, cultures and concurrent events which may impact intervention implementation (30)

Adherence assessment

In this study, implementation fidelity adherence was assessed based upon quantitative data, consistent with previous health care implementation fidelity studies (12, 19, 25, 29). The 3 quantitative data sets selected for this study related to: (1) range of OSP intervention activities delivered; (2) random sample of 10% of medication reviews assessed for quality; (3) proportion of residents who received at least one medication review. These quantitative data sets were chosen given the pragmatic nature of this study and as they provided insights into the extent of both resident and RACF level activities delivered as part of the OSP intervention.

Moderating factors

The moderating factors influencing OSP intervention delivery were identified based upon qualitative data, consistent with previous health care implementation fidelity studies (12, 18, 24, 25, 29). Explicit consideration of the moderating factors in this study is consistent with Bragstad et al.'s suggestion that adherence results need to be contextualised, thereby facilitating a more holistic understanding of implementation fidelity (12).

Participants and data collection

Activities undertaken as part of OSP intervention delivery were reported by OSPs via online pharmacist diaries on the Qualtrics survey platform (31). These activities were within the

current scope of practice of pharmacists registered with the Australian Health Practitioner Regulation Agency and were categorised into the following activities: clinical audits, medication reviews, communication, administrative tasks, vaccination, education, quality improvement and other. OSPs were also asked to maintain a written copy of medication reviews undertaken for residents.

Managers and OSPs across each of the 7 intervention RACFs were invited by email to participate in semi-structured interviews with a purposive (stratified) sampling approach employed (32). These two participant groups were selected as it was considered that they would have the most insight into OSP intervention delivery and the factors influencing delivery of this intervention. Interviews were audio-recorded, transcribed and deidentified to help maintain participant anonymity and confidentiality (33).

Data analysis

The online pharmacist diaries were downloaded from Qualtrics and cleaned and checked in Microsoft Excel. The proportion of residents who received at least one medication review was determined by the number of written medication reviews provided by OSPs to the study team. A random sample of 10% of these written medication reviews were assessed for quality by two Medication Management Review Accredited Pharmacists (accredited pharmacists) using a checklist adapted from Curtain's medication review quality assessment work (34). This checklist assessed the medication review recommendations made by OSPs in relation to clinical relevance, the appropriateness of recommendations and whether any recommendations were missed. The results of this checklist informed the overall quality of the medication review from high (n=5) through to low (n=1). The medication review quality assessment approach taken in this study builds upon the Care Home Independent Prescribing Pharmacist Study (CHIPPS) wherein a random sample of pharmaceutical care plans were reviewed for appropriateness by suitable experts (35).

For this study, the Intraclass Correlation Coefficient between the two accredited pharmacists was also assessed. This approach is consistent with Gearing et al.'s recommendations regarding the use of two or more independent raters and assessment of inter-rater reliability (22). For each of the 3 quantitative data sets, the study team developed an adherence scoring system, as well as an overall implementation fidelity adherence scoring system consistent with Bragstad et al.'s

implementation fidelity rating system of low, medium or high (12). Please see Additional file 1 for further details of these scoring systems. The use of these objective adherence scoring systems increases the validity and reliability of these fidelity measures, consistent with Gearing et al.'s recommendations (22).

For this study, the qualitative data was analysed using Ritchie and Spencer's framework analysis approach (36) with data deductively mapped to applicable moderating factors described in Hasson's conceptual framework for implementation fidelity. Co-authors contributed to data analysis and interpretation with NVivo used to support data management and assist with clear audit trail documentation (37). Qualitative data were reported according to the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist (38). Please see Additional file 2 for further details.

Data integration for this convergent parallel mixed methods study was undertaken at the interpretation stage with quantitative, qualitative and then integrated findings presented in this article. The mixed methods findings were reported noting Hadi et al.'s (39) recommendations to improve mixed methods research reporting for pharmacy practice researchers.

6.6 Results

Adherence

Range of OSP intervention activities delivered

Within the 7 intervention RACFs, the full range of OSP intervention activities were delivered. There was one exception to this with one OSP not able to offer vaccination services as they were unable to complete vaccination training due to COVID-19 restrictions affecting training availability. As such, the full range of OSP intervention activities were delivered across each of the 7 intervention RACFs as illustrated in Table 9.

Random sample of 10% of medication reviews assessed for quality

Assessment of a random sample of 10% of written medication reviews by two accredited pharmacists using a checklist indicated that the quality of medication reviews across the 7 intervention RACFs ranged from high (n=3), medium (n=3) through to low (n=1) as illustrated

in Table 9. The rounded mean score for the quality assessment of all written medication reviews was 3 out of 5 indicating an overall medium quality. Assessment of Intraclass Correlation Coefficient (ICC) indicated excellent reliability between the two accredited pharmacists, namely, an ICC of 0.922 (95 % CI: 0.697 to 0.974).

Proportion of residents who received at least one medication review

The proportion of residents who received at least one medication review was compared to the PiRACF study *a priori* activity target of 70% of residents receiving at least one medication review as part of the OSP intervention. OSPs supplied 588 written medication reviews to the study team and 61.1% of residents living across the 7 intervention RACFs received at least one medication review as part of the OSP intervention. In this study, using the adherence scoring system, adherence to this fidelity measure ranged from high (n=4), medium (n=1) through to low (n=2), see Table 9.

Overall implementation fidelity rating

Based upon the 3 quantitative data sets, the overall implementation fidelity adherence score for the 7 intervention RACFs ranged from high (n=1), medium-high (n=3) through to medium (n=2) and low-medium (n=1), as illustrated in Table 9. Overall, it appears that the OSP intervention was generally delivered with medium fidelity across the 7 intervention RACFs.

Table 9: Adherence assessment of RACFs

RACF	Range of OSP intervention activities delivered	Random sample of 10% of medication reviews assessed for quality	Proportion of residents who received at least one medication review	Overall score
1	Yes	High	Medium	Medium – High
2	Yes	Medium	High	Medium – High
3	Yes	Medium	Low	Low – Medium
4	Yes	Medium	High	Medium – High
5	Yes	High	Low	Medium
6	Yes	High	High	High
7	Yes	Low	High	Medium

Moderating factors

Fourteen interviews were undertaken with RACF managers (n=7) and OSPs (n=7 interviews with 6 OSPs [one OSP worked across two RACFs]). These interviews took between 38 to 163 minutes, with the median interview duration of 49 minutes for managers and 148 minutes for OSPs. Semi-structured interview participant details are shown in Table 10. Most pharmacists had over 10 years professional experience and five were accredited pharmacists. As such, this study was not able to determine if there may be a possible correlation between the level of pharmacist experience and intervention fidelity.

Table 10: Semi-structured interview participants

Profession	Number of participants	Age (years)	Gender	Length of employment at RACF (years)	Experience in aged care (years)	Professional experience (years)
On-site pharmacist	6*	≤ 40 (4, 67%) > 40 (2, 33%)	F (56, 83%) M (1, 17%)	≤ 1 (6, 100%)	Experience conducting Residential Medication Management Reviews (2, 33%) Community pharmacist experience supplying medications to RACF(s) (1, 17%) Accredited pharmacist (5, 83%) Experience in delivering Quality Use of Medicines Services (0, 0%)	≤ 5 (1, 17%) ≥ 10 (5, 83%)
RACF manager	8 managers (7 interviewed plus RACF manager who provided written feedback**)	≤ 50 (2, 25%) > 50 (6, 75%)	F (6, 75%) M (2, 25%)	≤ 1 (3, 37.5%) > 1 (5, 62.5%)	≤ 4 (2, 25%) > 4 (6, 75%)	≤ 15 (2, 25%) > 15 (6, 75%)

* Across the 7 intervention RACFs, one OSP was interviewed at each RACF with one pharmacist employed by two RACFs

** includes characteristics of RACF manager who provided written feedback in lieu of an interview

The qualitative interviews provided insights into the following moderating factors outlined in Hasson's conceptual framework for implementation fidelity: intervention complexity, facilitation strategies, quality of delivery, participant responsiveness and context (30). Please see Table 11 for the moderating factors, a summary of key findings and exemplary quotes.

Table 11: Moderating factors with a summary of key findings and exemplary quotes

Moderating factors	Summary of key findings	Exemplary quotes
Intervention complexity	It took time to work out how to deliver the OSP intervention	*when [the OSP] first started, we never had one, so we didn't know what to do with [the OSP] when [the OSP] started… I would say, it took us probably about three months to really get into the swing of what we needed [the OSP] to really do (M7.1)*
	Facilitator: study resource folder	*having that information [in the study resource folder] … meant that we were all coming from the same idea that we want to be accessible, reduce medications where possible and rationalise them, and improve medication management from being on site (OSP 7)*
	Barrier: OSP job description	*There were too many items on the attached Position Description provided at the commencement of [their] contract to be realistic for two days per week (M5.1)* *I didn't feel I have a very clear job description. The facility didn't know what my job was going to be either (OSP 1)*
Facilitation strategies	Facilitator: Pharmacist support meetings	*I love the three-monthly meetings... they've been really helpful just to reset and refocus and get a bit of guidance what to focus on next (OSP 6)*
Quality of delivery	Generally delivered to a high standard	*Two years ago at RACF 6, we were completely non-compliant with medications; we didn't meet the standard at all. So I'm being honest here. So in the last year, having [the OSP] here, we've been able to become completely compliant… having a pharmacist to go to… you can actually see the difference with medication management, [it] has improved immensely (M6.1)*
	One exception – one OSP not able to offer vaccination services	*I know [the OSP] did try to get that credential [to be able to vaccinate], but [they] couldn't find any courses that were available. That would probably be the only thing that would've been quite beneficial to us (M7.1)*
	Barrier: Part-time nature of OSP role	*I'm not always here when the GPs are here and I'm not always here when the changes are made (OSP 7)*

Moderating factors	Summary of key findings	Exemplary quotes
		It would have made an even greater impact if she was able to work more than two days per week to allow for greater follow up. e.g. if [the OSP] sent an email on Friday, [the OSP] could not follow up the response till the following Wed, five days later (M5.1)
	Facilitator: Prior OSP experience	*[The OSP] had already started at another facility before [they] started here… so we implemented pretty much what [they were] already doing at that other one here… And it kind of worked really well in with what we wanted to do, anyway… So within a couple of weeks, [we] were just flying (M6.1)*
Participant responsiveness	Participants mostly perceived that OSPs in RACFs added value and OSP intervention should continue	*it's just a very valuable resource [having the OSP] that would just only complement the clinical team and the workforce within the facility (M2.1)* *But if they could see their way clear to fund [an OSP], I think it'd be a good outcome for every aged care [facility] (M1.1)* *So I feel everyone is used to me being here and sees value in me being here and would like me to stay (OSP 1)*
	Participants [specifically RACF staff] were responsive	*They're all like that if [the OSP's] here, [the OSP's] helpful. I felt that they go to [the OSP] if they need to and ask questions if they have to (M3.1)*
	'Missed opportunities' identified by RACF managers	
	Limited OSP work day availability which contributed to delays in OSP intervention being delivered as intended	*I think we've got up to up to full-steam now over the last couple of months… [but] there was missed opportunity in the beginning which was no one's fault… [which] slowed the [initial] uptake of engagement with the GPs (M4.1)*
	Perceived limited impact of OSP intervention due to the OSP (who was not accredited) not focussing on medication reviews in their part-time role and relying upon RACF management to guide delivery	*But to actually – to really justify having someone, for us to take it on a permanent basis, I probably would have a hard time trying to explain it... I can't see any real big fundamental changes that have been made (M7.1)* *I think what we missed – the opportunity there was more deep dives into specific residents like where we were having residents who are having large amounts of falls or were particularly unwell (M7.1)* *And I think because the facility of our size … it's a very big job, and I think it was just a too big a job for [the OSP] to be able to do in the hours that [they were] here (M7.1)*

Moderating factors	Summary of key findings	Exemplary quotes
		I think it would've been good for the [OSP] to actually have an idea or have them have a plan of they wanted to do to support us. I think a lot of the onus was put on us (M7.1)
	OSP not being able to vaccinate	*[Their] colleague in RACF 6 was a lot more – well, in that respect, was a lot more useful because when the flu vaccinations came about, [OSP 6] administered all the flu vaccinations to the staff (M7.1)*
	Perceived limited capacity of the RACF manager to work with the OSP to further optimise OSP intervention delivery	*I think the busyness distracts me a lot where I could be working more with people like [the OSP] to look at how do we improve processes and systems. But I think there's a real opportunity there that I probably missed or [the OSP] might've missed where we could do more work together (M2.1)*
		I think it's an invaluable service that we're now going to lose, having an onsite pharmacy expert just, as I said, as a quick reference point then to help us with our assessment and management of residents and their medications (M2.1)
		it's sad knowing that the role's coming to an end because I think the longer [the OSP] would be here… [the more possible it would be] to see what else [the OSP] can do that would help us in our medication management (M2.1)
Context	OSP factors	
	Facilitator: OSPs who took time to establish relationships and were pro-active in informing OSP intervention delivery	*So I think that would give an incoming [OSP] a big advantage later down the track and save a lot of time, if they do establish their role and those relationships as soon as possible (OSP 6)*
		So basically, I had to inject myself and say, "Look, I can take that workload from you. I can do that for you. I can help with that," and really push a little bit at the beginning to say, "Look, I am actually here to help you and make your life easier." (OSP 1)
	Facilitator: Experienced accredited pharmacists	*And [the OSP] also said to us, "I feel like I could be of help here." (M1.1)* *Well, I guess being accredited really helped… I think that without that, I would have had to get into the groove of reviewing medication charts (OSP 3)*
	RACF factors	
	Facilitator: RACF managers who actively supported OSPs	*As Care Manager I worked closely with our onsite Pharmacist and gave [them] a clear list of priorities each week that we would like [them] to focus on (M5.1)*

Moderating factors	Summary of key findings	Exemplary quotes
		[The OSP] was sitting down in the Aged Care Funding Instrument office [initially which meant that the OSP's] not in any flow traffic, GPs [as well as residents and staff] weren't able to easily access [the OSP]. So, I moved [the OSP] into my office… [and] I think we did get [the OSP]… more included into the facility… [and] more probably in the middle of it (M7.1)
	Facilitator: Positive RACF culture	*The staff here and the residents here are all lovely. The staff are really putting their residents first. The attitude is very – it's a family, we're looking after each other, and they're really supportive of each other as well and I feel like that flows through to the care and encourages me to care more as well, and do my best (OSP 1)*
	Barrier: RACFs spread out over a large area with significant distance between resident dwellings	*partly because of the way it's set up … you stay in your bubble a lot more here than at the previous [RACF] which was all one big communal space… It's not an organic thing here. I have to actually go to the [resident dwellings in this RACF which is spread out] and meet them and talk to them and all that which is a bit different. It is a much bigger facility as well. So getting to know particular residents really, really well has been a lot harder, whereas at the last facility, there were some residents that I saw every day that I was there and got to know really, really well (OSP 6)*
	External factor	
	Barrier: COVID-19 pandemic	*Look, it [the OSP intervention] came at a really tricky time of COVID-19… [we were] so busy focusing on compliance with COVID-19 monitoring requirements (M4.1)*
		So there was a bit of time [due to COVID-19] where it was difficult to talk to the residents… it was stressful a bit for the staff especially, and we had to wear masks all the time for a while, and some of the residents expressed frustration and difficulty seeing their family and all that. But my role as such, I was still able to do most of my tasks, it's just the talking to people and to the residents, that was really restrictive. And to be honest, it's taken a while to get back out of that habit (OSP 1)

Intervention complexity

The qualitative findings suggested that it took time for OSPs and RACF managers to work out how to deliver the OSP intervention, which is not unexpected given the relative novelty of the OSP role and the complexity of the intervention. OSPs considered that the OSP intervention description outlined in the study resource folder was informative and useful in assisting them with delivering this complex intervention. However, some OSPs and RACF managers

mentioned that the OSP job description was not as descriptive or instructive as it could have been to support OSP intervention delivery.

Facilitation strategies

A range of facilitation strategies were employed to support delivery of the OSP intervention. These included face-to-face training sessions for OSPs, inclusive of the Residential Aged Care Pharmacist: Foundation Training Program facilitated by the Pharmaceutical Society of Australia (PSA), RACF induction checklist for onboarding OSPs, study team induction meeting with individual RACF managers, as well as with individual OSPs which focussed on OSP orientation, 4 hour face-to-face quarterly pharmacist support meetings held at the University of Canberra, Microsoft Teams Online Forum to allow OSPs to share information and ask questions in an asynchronous manner and ad hoc individual check ins with OSPs by the study team via face-to-face visits to RACFs and emails. All OSPs attended the half day face-to-face training session and pharmacist support meetings. Overall, OSPs indicated that the facilitation strategies employed, in particular, the pharmacist support meetings, were conducive to the OSP intervention being delivered as intended.

There was however some room for improvement identified in relation to OSP training provided with two OSPs expressing an interest in more palliative care training and self-nominating to attend a Program of Experience in the Palliative Approach (PEPA) training session during the 12-month OSP intervention.

Quality of delivery

Most of the RACF managers interviewed indicated that the OSP intervention was generally delivered to a high standard. With regards to quality of delivery, one key exception related to one OSP who was not able to offer vaccination services to RACF staff as they were unable to complete vaccination training due to COVID-19 restrictions affecting training availability. While all other OSPs offered vaccination services to RACF staff, some OSPs were not able to undertake these services due to vaccination fridge unavailability at two RACFs and due to one RACF using an existing external contractor arranged by their parent organisation. A specific barrier to the quality of delivery identified by four OSPs and two managers related to the part-time nature of the OSP role. One OSP worked across two intervention RACFs participating in

the PiRACF study and described how their OSP experience at the first RACF aided them to support OSP intervention delivery with greater ease at the second RACF. This suggested that prior OSP experience was a potential facilitator for delivering the intervention.

Participant responsiveness

Most OSPs and managers engaged well with delivery of the OSP intervention with most participants perceiving that OSPs in RACFs added valued and that the OSP intervention should be continued in the future. The qualitative findings also suggested that others, such as RACF staff, were responsive to delivery of the OSP intervention.

However, three RACF managers did identify barriers which contributed to OSP intervention 'missed opportunities' within their RACFs. One RACF manager described that the OSP's limited work day availability and being unwell at the start of the intervention contributed to delays with the OSP establishing relationships with General Practitioners. This meant that it took additional time for the OSP intervention to be optimally delivered.

A second RACF manager perceived limitations on the impact of the OSP intervention due to the OSP at their RACF, who was not accredited, not focussing on medication reviews in the part-time role with limited hours available. The manager also highlighted that the OSP's reliance upon RACF management to guide OSP intervention delivery meant that the OSP intervention may not have been optimally delivered.

The one exception where an OSP was not able to vaccinate also presented a missed opportunity within that RACF. The manager at another RACF outlined their limited capacity to engage with the OSP to identify opportunities to work together to further optimise delivery of the OSP intervention.

Context

Based upon the semi-structured interviews with RACF managers and OSPs, OSP factors, RACF factors and an external factor may have influenced the fidelity of OSP intervention delivery.

OSPs factors

The qualitative findings suggested that RACFs with OSPs who took the time to establish relationships and were pro-active in informing OSP intervention delivery potentially increased the likelihood of the OSP intervention being delivered as intended. Three OSPs also considered that their accredited pharmacist status and experience conducting medication reviews may have helped them to deliver the OSP intervention.

RACF factors

Semi-structured interview participants described how RACF leadership and culture affected OSP intervention delivery. RACFs with management who consistently took the time to work with OSPs to inform OSP intervention delivery and actively supported OSPs within their respective RACFs potentially increased the likelihood of the OSP intervention being delivered as intended. As might be expected, there was a sense that RACFs with a positive culture focussed on collaboration and patient-centred care also increased the likelihood of delivering the OSP intervention as intended.

RACFs spread out over a large area with significant distance between resident dwellings was perceived as a potential barrier to OSP intervention delivery. One OSP who worked across two RACFs perceived that a RACF with this physical environment, as compared to one with a main RACF building, potentially decreased the likelihood of delivering the OSP intervention as intended. It appeared to be more difficult for an OSP to establish and maintain connections with health care team members and residents in the more spread out RACF physical environment without the OSP making a concerted effort to overcome this barrier.

External factor

One external factor was identified as a potential barrier to OSP intervention delivery, namely the COVID-19 pandemic. As the OSP intervention commencement was staggered from April 2020 – January 2021, this meant that the impact of COVID-19 varied across intervention RACFs, though there were commonalities in relation to an overall increased workload on RACF staff and managers trying to mitigate the risk of COVID-19 for residents and RACF staff. One OSP who commenced in 2020 described how the COVID-19 pandemic initially limited their capacity to engage with residents, family members and RACF staff and that it then took some time to re-engage with them.

Integrated findings

The quantitative findings indicated that the OSP intervention was generally delivered as intended with a range of fidelity from low-medium to high and an overall finding of medium fidelity across the 7 intervention RACFs. These adherence scores were based upon 3 quantitative data sets: (1) range of OSP intervention activities delivered; (2) random sample of 10% of medication reviews assessment for quality; (3) proportion of residents who received at least one medication review. Across the 7 intervention RACFs, the full range of activities were delivered, there was an overall medium quality assessment of medication reviews and 61.1% of residents received at least one medication review (as compared to the PiRACF study a priori activity target of 70%). The qualitative findings illustrated that the facilitation strategies in place supported OSP intervention delivery, that participants were mostly responsive to the OSP intervention and that the quality of delivery was generally perceived to be of a high standard.

Importantly, missed opportunities were identified by 3 RACF managers which potentially impacted OSP intervention delivery. These included: OSP work day availability which contributed to delays in the OSP intervention being optimally delivered; perceived limited OSP intervention impact due to a non-accredited OSP who was not able to focus on medication reviews during their part-time role whom was also not pro-active in guiding OSP intervention delivery; one OSP not being able to vaccinate; and perceived limited capacity of a RACF manager to work with the OSP to further optimise OSP intervention delivery. Potential barriers (including the part-time OSP role, COVID-19 pandemic, RACFs spread out over a large area with significant distance between resident dwellings) and facilitators (including the study resource folder, pharmacist support meetings, OSPs who took time to establish relationships, experienced accredited pharmacists, RACF managers who actively supported OSPs and worked with them, positive RACF culture) were also identified. Overall, it appears that the medium fidelity of OSP intervention delivery was influenced, either positively or negatively, by a range of moderating factors.

6.7 Discussion

This mixed methods study used an established conceptual framework to understand the extent of implementation fidelity and the moderating factors influencing the implementation fidelity of OSP intervention delivery. Prior to the roll out of OSPs within Australian RACFs, it is

important to understand whether the OSP intervention can be delivered as intended and what factors moderated intervention delivery. This study found that OSP intervention delivery was implemented with overall medium fidelity across the 7 intervention RACFs. Furthermore, several moderating factors contributed to this fidelity, consistent with other health care implementation fidelity studies (25, 29). The facilitation strategies in place were conducive to delivery of the OSP intervention as intended. Participants were generally responsive and most participants considered that the quality of the intervention was to a high standard. Contextual factors (OSP, RACF and external i.e. COVID-19 pandemic) and the complexity of the intervention itself also impacted OSP intervention delivery. A new and novel contribution of this study was that it identified potential barriers and facilitators to successful OSP intervention delivery in Australian RACFs. More pharmacists with prior OSP experience would likely further support implementation of this intervention in the future.

This study's finding of an overall medium fidelity rating is relatively comparable to other studies assessing the implementation fidelity of pharmacist interventions in other health care settings (17-19). Sluggett et al.'s mixed method process evaluation of the SImplification of Medications Prescribed to Long-tErm care Residents (SIMPLER) study undertaken in Australian RACFs concluded that their intervention was also generally delivered as intended (16). The lack of clearly defined adherence measures in health care settings has been previously identified (29) and further consideration of suitable adherence measures to help with standardisation of implementation fidelity assessment for future pharmacist RACF intervention studies is encouraged.

The findings of this study indicated that there were moderating factors which informed OSP intervention delivery. Consistent with van der Laan et al.'s study (18), which assessed implementation fidelity of an intervention in Dutch community pharmacies, this study's participants suggested that the intervention generally added value with participants mostly responsive to intervention delivery. Facilitation strategies, inclusive of training provided to pharmacists in this study were important for successful intervention delivery, similar to other pharmacist intervention studies which have assessed implementation fidelity (17, 18). Akin to En-Nasery-de Heer et al.'s mixed method study (17) which explored implementation fidelity of a pharmacist-led intervention involving Dutch community and hospital pharmacists, this

study also identified potential barriers for intervention delivery in relation to intervention complexity and time constraints.

According to Hasson, the more clearly defined and described the intervention, the higher the likelihood of fidelity (30). As such, it is recommended that future efforts to adopt OSPs in Australian RACFs include additional documentation supportive of OSP intervention delivery, particularly in relation to operationalising the OSP intervention which could potentially include initial and ongoing promotion of the OSP role. In addition, tailored support to OSPs and RACF management to facilitate more consistent delivery of the OSP intervention such as through development of additional checklists and guidance documents may be beneficial.

Further exploration of the extent of OSP full-time equivalent employment required, particularly within RACFs spread out over a large area with significant distance between resident dwellings, to support effective delivery of the OSP intervention is required.

OSPs highly valued the pharmacist support meetings which enabled them to share their experiences and insights with each other. While the role of pharmacists in Australia has expanded beyond community and hospital pharmacy into Aboriginal Community Controlled Health Organisations (ACCHOs) (40), General Practices (41) and now into RACFs (10), there are limited opportunities available for these pharmacists to meet and connect with other pharmacists working in similar roles. Current avenues which OSPs could access to connect with other non-community and non-hospital pharmacists are limited to the Pharmaceutical Society of Australia's Interdisciplinary Team-Based Care Community of Speciality Interest (42). It is recommended that there be further consideration of options to support future OSPs working in Australian RACFs to sustainability connect with each other now and into the future.

In anticipation of the roll out of OSPs within Australian RACFs it would be highly beneficial to consider the overall educational needs of pharmacists commencing in this recently created role. As there is sparse literature on the educational needs of OSPs working in RACFs, in time, when there is a body of experts with expertise on OSPs within RACFs, it is strongly encouraged that consensus be reached on OSP educational needs through undertaking either a Nominal Group Technique or Delphi Technique (43). Benson et al.'s Delphi study provides an instructive templar on Australian General Practice Pharmacist educational needs (44). In the interim, it may be useful for OSP educational needs to be guided by the recommended

qualifications, skills and training requirements outlined for pharmacists integrated into ACCHOs, General Practices and RACFs within the PSA Pharmacists in 2023: Roles and Remuneration document (45), alongside completion of the PSA Residential Aged Care Pharmacist: Foundation Training Program (or equivalent). Further exploration of the minimum level and extent of pharmacist experience required to effectively support delivery of the OSP intervention is needed.

As identified by Tait et al, pharmacists can contribute to interprofessional collaborative care for older people living in the community and RACFs as they near their end of life (46). As such, including additional palliative care training to develop OSP skills in end-of-life medication management discussions with residents and family members is strongly encouraged. At a minimum, it is recommended that OSPs should complete the Palliative Care Online Training developed based upon the palliAGED online resources (47) and attend a Program of Experience in the Palliative Approach (PEPA) training session to further understand the use of medications at end-of-life and become more confident in discussing end-of-life care with residents, family members and RACF staff. The potential role of OSPs in supporting residents with end-of-life care needs alongside health care team members and family members, should also be further explored.

Consistent with Choi et al.'s mixed method study (23) which explored implementation fidelity of a person-centred complex intervention in South Korean nursing homes, RACF culture appeared to impact intervention delivery in this study. Given that the OSP intervention was implemented within an existing RACF health care team and culture, we would reaffirm Palmer et al.'s recommendation that organisation readiness be assessed before implementing interventions (24). One tool which could be employed before implementation of an OSP intervention within Australian RACFs is the Organisational Readiness to Change Assessment (ORCA) (48). The ORCA tool could potentially help to increase implementation fidelity with its specific consideration of contextual measures (such as staff culture, senior leadership culture) and facilitator measures (such as project communication, planning and team roles to support intervention delivery) (48).

This is the first study that has evaluated the implementation fidelity of an OSP intervention delivered within Australian RACFs. This study demonstrated that the OSP intervention could be delivered with medium fidelity across 7 intervention RACFs and reaffirmed the importance

of understanding moderating factors which could help to identify barriers or facilitators to successful OSP intervention delivery.

Policy makers, primary health networks, peak pharmacy organisations, researchers, health professionals and RACF management are strongly encouraged to consider the findings of this study and recommendations made prior to the roll out of OSPs in Australian RACFs. These study findings could help inform future efforts to address potential barriers and enhance potential facilitators for successful adoption of OSPs in real-world RACFs.

Strengths and limitations

Strengths of this study was the use of mixed methods study design, an existing implementation fidelity framework and development of objective fidelity scoring systems.

Study limitations related to the qualitative findings not being generalisable to other non-metropolitan RACFs. As direct observations by the study team were not conducted and the quantitative activities data was self-reported, potential data accuracy issues may exist (49).

6.8 Conclusion

This mixed methods study concluded that the OSP intervention was generally delivered as intended across the 7 intervention RACFs with an overall medium fidelity rating. OSP intervention delivery was affected by a range of moderating factors, specifically, intervention complexity, facilitation strategies, quality of delivery, participant responsiveness and context. A number of potential barriers and facilitators to successful OSP intervention delivery were also identified. The findings of this study have important implications for the roll out of OSPs in Australian RACFs and further OSP research studies.

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Availability of data

The deidentified quantitative data used to support the findings of this study are available from the corresponding author upon request. The qualitative data is not available as it is possible that this data could be re-identified.

Ethics approval and consent to participate

The Human Research Ethics Committee at University of Canberra (HREC-2007), Calvary Public Hospital Bruce (30-2019) and ACT Health (2019/ETH13453) approved this study.

Participants provided written consent prior to participating in interviews and prior to reporting OSP intervention activities delivered.

Competing interests

Nil to declare.

Authors' contributions

MB, JK, SK and MN conceptualised and designed the study. JL and KS provided feedback on the study methodology. SK, JK and MB developed the agreed upon checklist for assessing the quality of medication reviews. SK and MN assessed the quality of medication reviews. MB collected, analysed and interpreted the qualitative data. JK, SK, MN, JL and KS contributed to interpretation of quantitative and qualitative data. MB drafted the first and final version of the manuscript. All authors read, provided suggestions for revision and approved the final manuscript.

Additional file 1: Adherence scoring systems

Additional file 2: Qualitative findings reported according to the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist (38)

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Additional file 1: Adherence scoring systems

Range of OSP intervention activities delivered – scoring system

Rating	Activities undertaken
Yes	Full range of OSP activities* delivered
No	Full range of OSP activities* not delivered

* Coverage across all OSP intervention activities inclusive of clinical audits, medication reviews, communication, administrative tasks, vaccination, education, quality improvement and other

Random sample of 10% of medication reviews assessed for quality – scoring system

Rating	Quality assessment**
High	≥ 4
Medium	3
Low	≤ 2

** rounded mean score

Proportion of residents who received at least one medication review – scoring system

Rating	Proportion compared to *a priori* activity target of 70%
High	≥70%
Medium	69 – 46%
Low	≤ 45%

Overall implementation fidelity adherence – scoring system

Quantitative data set 1	Quantitative data set 2	Overall score***
High	High	High
High	Medium	Medium – High
Medium	Medium	Medium
High	Low	Medium
Medium	Low	Low – Medium
Low	Low	Low

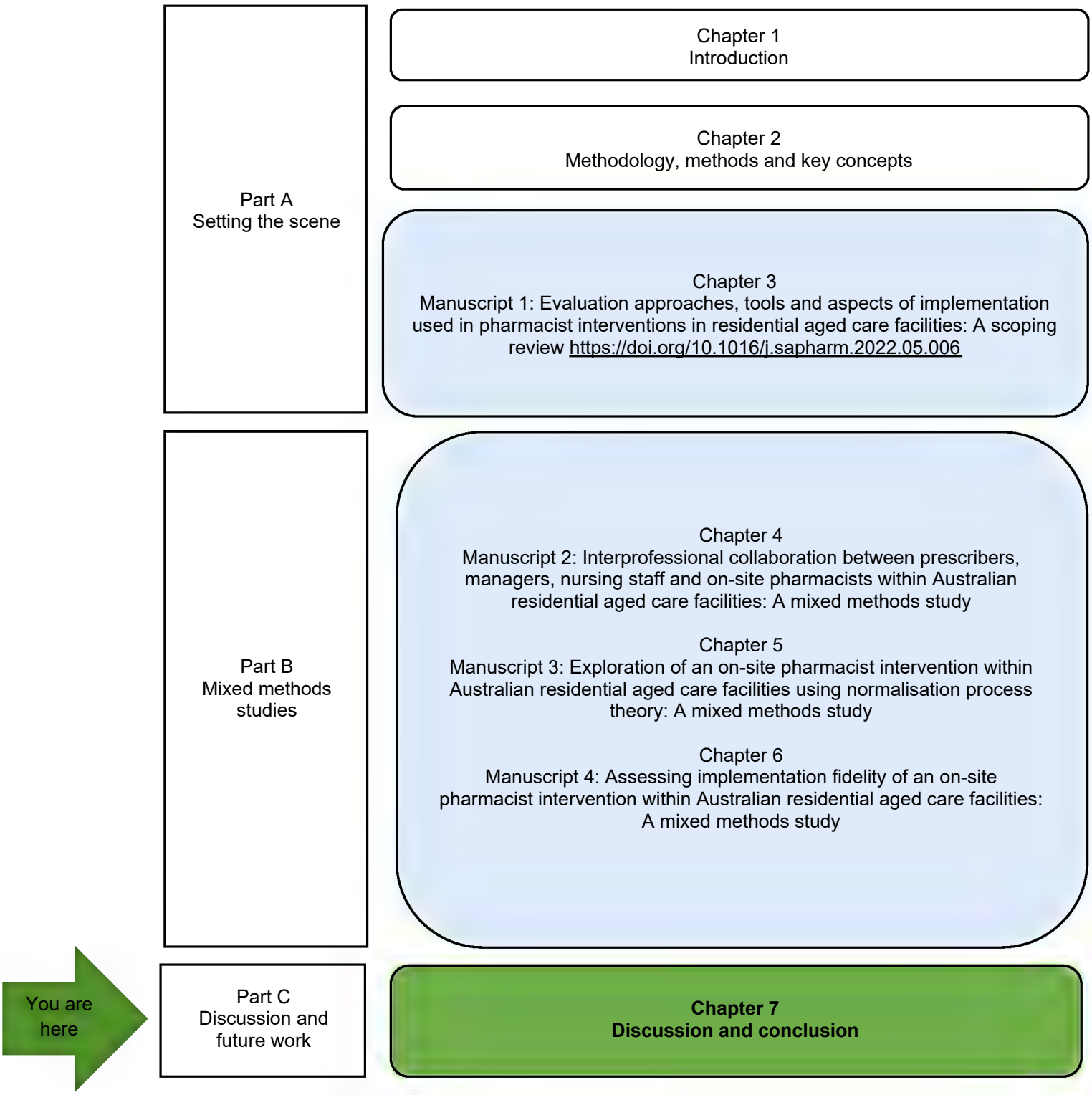
***If the full range of OSP activities are all delivered (Yes), Overall score to remain the same rating. If the full range of OSP activities are not all delivered (No), Overall score to be rated down from High to Medium-High, Medium-High to Medium, Medium to Low-Medium, Low-Medium to Low

Additional file 2: Qualitative findings reported according to the Consolidated criteria for reporting qualitative research (COREQ) checklist (Tong et al., 2007)

No Item	Guide questions/description
Domain 1: Research team and reflexivity	
Personal Characteristics	
1. Interviewer/facilitator	Which author/s conducted the interview or focus group? Lead author with prior qualitative experience
2. Credentials	What were the researcher's credentials? *E.g. PhD, MD* Bachelor of Pharmacy, Master of Public Health and PhD candidate
3. Occupation	What was their occupation at the time of the study? PhD candidate
4. Gender	Was the researcher male or female? Female
5. Experience and training	What experience or training did the researcher have? Master of Public Health with prior qualitative experience
Relationship with participants	
6. Relationship established	Was a relationship established prior to study commencement? This did not occur with RACF managers, but the lead author had met on-site pharmacists (OSPs) at a face-to-face pharmacist support meeting prior to conducting interviews
7. Participant knowledge of the interviewer	What did the participants know about the researcher? *e.g. personal goals, reasons for doing the research* Participants were aware that the researcher was a PhD candidate
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.*g. Bias, assumptions, reasons and interests in the research topic* Participants were aware that the interviewer was part of the PiRACF study team and a PhD candidate prior to interviews commencing
Domain 2: study design	
Theoretical framework	
9. Methodological orientation & Theory	What methodological orientation was stated to underpin the study*? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis* This study was informed by a pragmatism research design, underpinned by a qualitative descriptive approach
Participant selection	
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball

	A purposive (stratified) sampling approach was used
11. Method of approach	How were participants approached? e.*g. face-to-face, telephone, mail, email* Participants were recruited by the lead author via email
12. Sample size	How many participants were in the study? 14
13. Non-participation	How many people refused to participate or dropped out? Reasons? Not applicable
Setting	
14. Setting of data collection	Where was the data collected?*e.g. home, clinic, workplace* Interviews were held online
15. Presence of non-participants	Was anyone else present besides the participants and researchers? No non-participants were present during interviews
16. Description of sample	What are the important characteristics of the sample? *e.g. demographic data, date* Participants consisted of at least one RACF manager and at least one OSP from each of the 7 intervention sites. Interviews were conducted between April – October 2020
Data collection	
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested? An interview guide was used which was initially pilot tested with a nurse and pharmacist with aged care experience
18. Repeat interviews	Were repeat interviews carried out? If yes, how many? No repeat interviews were conducted, although the OSP interviews were conducted in two sessions to minimise participant burden
19. Audio/visual recording	Did the research use audio or visual recording to collect the data? Audio recordings
20. Field notes	Were field notes made during and/or after the interview or focus group? To support ongoing reflexivity, the lead author completed a templated contact summary sheet after each interview to contemporaneously document the researcher's reflections and maintained a reflexive diary to record the research process and reflections
21. Duration	What was the duration of the interviews or focus group? Interviews ranged from 38 to 163 minutes in duration
22. Data saturation	Was data saturation discussed?

	The interview sample size was predetermined taking a pragmatic approach to available time and resourcing (Doyle et al., 2019). While a recent study has suggested that data saturation can be achieved with between 9-17 interviews (Hennink & Kaiser, 2021), the use of data saturation to inform interview sample sizes for non-grounded theory qualitative research remains debatable (Doyle et al., 2019; Malterud et al., 2016)
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction? No
Domain 3: analysis and findings	
Data analysis	
24. Number of data coders	How many data coders coded the data? The leader author coded the data
25. Description of the coding tree	Did authors provide a description of the coding tree? No
26. Derivation of themes	Were themes identified in advance or derived from the data? Themes were derived from the data using framework analysis, inclusive of the development of a coding framework and identification of themes. Data was then deductively mapped to applicable moderating factors described in Hasson's conceptual framework for implementation fidelity (Hasson, 2010)
27. Software	What software, if applicable, was used to manage the data? NVivo was used
28. Participant checking	Did participants provide feedback on the findings? No
Reporting	
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? *e.g. participant number* Yes, quotes identified by participant number were presented to illustrate the findings
30. Data and findings consistent	Was there consistency between the data presented and the findings? Yes
31. Clarity of major themes	Were major themes clearly presented in the findings? Yes
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes? Yes


Part A
Setting the scene
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Chapter 2
Methodology, methods and key concepts
Chapter 3
Manuscript 1: Evaluation approaches, tools and aspects of implementation used in pharmacist interventions in residential aged care facilities: A scoping review https://doi.org/10.1016/j.sapharm.2022.05.006
Part B
Mixed methods studies
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Chapter 5
Manuscript 3: Exploration of an on-site pharmacist intervention within Australian residential aged care facilities using normalisation process theory: A mixed methods study
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Chapter 7 Discussion and conclusion

7.1 Introduction

The overall aim of this thesis was to evaluate key components of an OSP intervention, specifically, interprofessional collaboration, normalisation and implementation fidelity, nested within the *Pharmacists in Residential Aged Care Facilities* (PiRACF) study context.

This thesis answered four research questions:

1. What was the breadth and depth of evaluation approaches, evaluation tools and aspects of implementation used in evaluated peer-reviewed pharmacist interventions in RACFs? (Chapter 3)

2. What was the extent of interprofessional collaboration between OSPs and prescribers, managers and nursing staff and what was the nature of these working relationships? (Chapter 4)

3. What was the extent of OSP normalisation (i.e. OSPs becoming part of routine practice) and how were OSPs normalised? (Chapter 5)

4. What was the implementation fidelity of OSP intervention delivery and what were the moderating factors influencing delivery? (Chapter 6)

The current chapter outlines key thesis findings for each study and provides an overall summary of this thesis's original contribution to knowledge. It describes the key integrated thesis finding obtained through synthesis of the qualitative and quantitative findings, clarifies the strengths and limitations of the research undertaken, discusses implications for policy and practice and identifies recommendations for further research.

7.2 Key study findings

The scoping review identified potential research gaps, namely, limited evaluation of interprofessional collaboration, sparse use of theory to guide evaluation and limited consideration of implementation fidelity in the current evaluated peer-reviewed pharmacist intervention in RACF literature.

Based upon these potential gaps, a mixed methods approach was used in the three mixed methods studies reported in this thesis to evaluate and enhance understanding of the extent and factors influencing interprofessional collaboration, normalisation and implementation fidelity of an OSP intervention. This thesis expands the nascent understanding of how OSPs can potentially work within RACFs, inclusive of whether they can contribute to interprofessional collaborative care, can become part of routine practice within RACFs and whether the OSP intervention can be delivered as intended in real-world RACFs. The key study findings for each of the studies reported in this thesis are illustrated in Table 12.

Table 12: Key study findings

Research Question 1 **What was the breadth and depth of evaluation approaches, evaluation tools and aspects of implementation used in evaluated peer-reviewed pharmacist interventions in RACFs?**	
Key findings	
Scoping review findings (n=56 articles included)	• Four articles were underpinned by evaluation guidance, one used an evaluation framework and none used theory to guide evaluation • The most frequently reported barrier (when absent) or facilitator (when present) related to relationships, trust and respect. For this scoping review, this implementation factor was taken to be reflective of the absence or presence of interprofessional collaboration. However, interprofessional collaboration was not assessed within any of these evaluation studies • None of the 56 articles assessed implementation fidelity
Builds upon existing knowledge	• This study used terminology that is routinely applied in evaluation and implementation research, and this terminology can be readily used in pharmacy practice research
Original contribution to knowledge	• No systematic reviews considering evaluation and implementation approaches in relation to this research area were identified • This is the first scoping review that has focussed on the application of evaluation approaches, evaluation tools and aspects of implementation in relation to pharmacist interventions in RACFs
Research Question 2 **What was the extent of interprofessional collaboration between OSPs and prescribers, managers and nursing staff and what was the nature of these working relationships?**	
Key findings	
Qualitative	• The semi-structured interviews conducted with OSPs, prescribers, managers and nursing staff (n=33) indicated that three themes were identified relating to the process of establishing relationships, OSP characteristics, and the perceived (or potential) benefit of OSPs • Critically, it did not appear that OSPs were perceived as encroaching upon the professional boundaries of the health care team members interviewed
Quantitative	• The adapted survey results related to T1 (from three months of OSP commencement) and T2 (from nine months of OSP commencement) (T1: n=33; T2: n=19) • There was no difference in survey scores at T1 and T2 (p=0.96)

Integrated	• This study demonstrated that positive interprofessional collaborative working relationships between OSPs and prescribers, managers and nursing staff (health care team members) could be established and maintained • The positive qualitative findings were complemented by the adapted survey results • These promising findings suggested that further exploration of the OSP intervention was warranted
Builds upon existing knowledge	• Adapted survey results were consistent with survey scores reported in previous studies underpinned by McDonough and Doucette's conceptual model for the development of pharmacist-physician collaborative working relationship (CWR) (Hakansson Lindqvist et al., 2019; Makowsky et al., 2009; Snyder et al., 2010) • This study reaffirms the findings of previous studies underpinned by CWR e.g. importance of pharmacists leading relationship building efforts (Doucette et al., 2005; Hakansson Lindqvist et al., 2019), face-to-face interactions (Al-Jumaili et al., 2017; Rathbone et al., 2016; Snyder et al., 2010) and pharmacist proximity on-site (Hakansson Lindqvist et al., 2019; Snyder et al., 2010), as well as pharmacist approach and personality (Hakansson Lindqvist et al., 2019)
Original contribution to knowledge	• This study is the first to explore interprofessional collaboration between OSPs and prescribers, managers and nursing staff (health care team members) in RACFs, and is the first study to use CWR to explore interprofessional collaboration within RACFs • This study describes the ways in which OSPs are well positioned to develop and maintain positive interprofessional collaborative working relationships with health care team members • Unlike previous studies, this study determined that it took 2 – 4 months for OSPs and health care team members to establish positive working relationships
Research Question 3 **What was the extent of OSP normalisation (i.e. OSPs becoming part of routine practice) and how were OSPs normalised?**	
Key findings	
Qualitative	• The semi-structured interviews with prescribers, managers, nursing staff (health care team members), OSPs, residents and family members (n=47) indicated that most participants considered that OSPs could become part of routine practice, that OSPs working at their RACF were beneficial, that OSPs generally reduced workloads, that it was easy to integrate working with OSPs and that OSPs were not perceived as disrupting existing relationships • From the resident and family member perspective it was identified that one potential contribution of OSPs could relate to them providing a 'broker' role within RACFs to support family member navigating and connecting with relevant health care team members, particularly when loved ones are first admitted to a RACF • One family member [FM3.1] also described how they valued being able to speak with the OSP to increase their medication knowledge and thus become confident when discussing medication management decisions with prescribers

Quantitative	• Adapted survey results (n=16) were consistently positive across the four Normalisation process theory (NPT) constructs (coherence, cognitive participation, collective action and reflexive monitoring)
Integrated	• OSPs were generally considered to be normalised within their respective RACFs and this was complemented by this study's adapted survey results
Builds upon existing knowledge	• Compared with previous studies using NPT (Huddlestone et al., 2020), this study more explicitly incorporated insights from multiple stakeholders, including residents and family members, to understand OSP normalisation from a system- wide perspective
Original contribution to knowledge	• This study is the first to explore normalisation and use NPT within the context of an Australian RACF • Previous studies had suggested that residents living in RACFs are seldom empowered around medication management (Hughes & Goldie, 2009; Nizaruddin et al., 2017). This study suggested that some OSPs were able to increase the medication knowledge of and empower some residents and family members in relation to discussing medication management decisions • The findings of this study highlighted the value of using theory to guide evaluation of a pharmacist intervention in RACFs • This study could help inform the future role of OSPs working within Australian RACFs through increased understanding of the workability and integration of this relatively new role within RACFs
Research Question 4 **What was the implementation fidelity of OSP intervention delivery and what were the moderating factors influencing delivery?**	
Key findings	
Qualitative	• The semi-structured interviews with RACF managers and OSPs (n=14) indicated that the facilitation strategies employed, particularly, the pharmacist support meetings, were conducive to delivery of the OSP intervention as intended • Most participants perceived that the intervention was delivered to a high standard and there were generally good levels of engagement with the intervention • Importantly, missed opportunities were identified by three RACF managers that potentially impacted OSP intervention delivery [M4.1, M7.1 and M2.1] • Potential barriers (e.g. part-time OSP role, COVID-19 pandemic, RACFs spread out over a large area with significant distance between resident dwellings) and facilitators (e.g. study resource folder, pharmacist support meetings, OSPs who took time to establish relationships, experienced Medication Management Review Accredited Pharmacists, RACF managers who actively supported OSPs and worked with them, positive RACF culture) were also identified, which may have influenced intervention delivery
Quantitative	• The overall fidelity of each intervention RACF ranged from low-medium through to high, with an overall finding of medium fidelity • The overall fidelity assessment was reflective of the full range of OSP intervention activities being delivered. Medication reviews undertaken as part of the intervention were assessed to be of medium quality with 61.1% of residents having received at least one medication review as part of the OSP intervention (slightly lower than the PiRACF study *a priori* target of 70%)

Integrated	• A range of moderating factors affected intervention deliver thereby potentially posing either barriers or facilitators to optimal delivery of the OSP intervention
Builds upon existing knowledge	• Consistent with other implementation fidelity studies, several moderating factors contributed to OSP intervention fidelity (Nurjono et al., 2020; Perez et al., 2020) • A previous pharmacist study that assessed implementation fidelity in an Australian RACF had a similar fidelity rating (medium) (Sluggett et al., 2021b) • Some similar barriers (complexity and time constraints) were identified in a Dutch pharmacist intervention study that assessed implementation fidelity (En-Nasery-de Heer et al., 2022)
Original contribution to knowledge	• This study is the first to evaluate the implementation fidelity of an OSP intervention delivered within Australian RACFs • This study is the first to use Hasson's conceptual framework for implementation fidelity within Australian RACFs • This study identified potential barriers and facilitators to successful OSP intervention delivery in real-world RACFs which has potential implications for the roll out of OSPs within Australian RACFs commencing from 2023

7.3 Original contribution to knowledge

The current evaluated peer-reviewed pharmacist intervention in RACF literature seldom explores interprofessional collaboration, and sparsely uses theory to guide evaluation, alongside limited assessment of implementation fidelity (Batten et al., 2022). Overall, the findings of this research have addressed these three potential gaps in the literature. This research also provides an original contribution to knowledge by investigating the potential (or perceived) benefit of OSPs, inclusive of their ability to establish and maintain positive interprofessional collaborative care and become part of routine practice (i.e. normalised) within RACFs, as well as identifying potential barriers and facilitators to delivery of the OSP intervention.

This research constitutes an important contribution as it contains the first studies that have evaluated interprofessional collaboration, normalisation and implementation fidelity of an OSP intervention within Australian RACFs. It is argued that evaluation of these key components of the OSP intervention were vital to expanding understanding of the OSP role as well as the perceived (or potential) benefits of OSPs working within RACFs to help improve medication management.

Prior to undertaking this research, there was limited understanding of how OSPs could potentially work with RACF health care team members within Australian RACFs, and how this

relatively new role was perceived by residents and family members. Likewise, there were no comprehensive studies or literature to answer questions relating to whether OSPs could establish and maintain positive working relationships with health care team members, whether OSPs could become part of routine practice in real-world RACFs and whether the OSP intervention itself could be delivered as intended across multiple intervention RACFs. Moreover, findings from this research have illustrated the value of using an existing theory, model or framework to help understand a pharmacist intervention conducted in real-world RACFs.

This thesis has uncovered several new and important insights into the ways in which OSPs, health care team members, residents and family members can work together collaboratively to support improved medication management in real-world RACFs. It has also contributed to the emerging topic of integrated pharmacists working within Australian RACFs.

7.4 Strengths and limitations

The strengths and limitations of each study are individually reported in Part B (Chapters 3-6). A synthesis of the overall strengths and limitations of this thesis is discussed here.

The scoping review concluded that there was sparse consideration of interprofessional collaboration, limited uptake of evaluation theory, and that implementation fidelity was seldom assessed. A strength of this research is that the mixed methods studies reported addressed these three potential gaps in the current evaluated peer-reviewed pharmacist intervention in RACF literature.

Further strengths related to the use of a mixed methods approach, which allowed for an enriched understanding of the phenomenon of interest (Glenton et al., 2011; Greene et al., 1989). The decision for each study to be underpinned by an existing theory, model or framework was consistent with the increased interest in their utilisation in the broader literature (Nilsen, 2015). This thesis included insights from a range of RACF stakeholders, including GPs, nurse practitioners, RACF managers, nursing staff and OSPs, as well as residents and family members across the intervention RACFs. The insights and perspectives of these stakeholders were critical to increasing understanding of this relatively new role within RACFs.

There is the potential for limited generalisability given that this research was conducted in metropolitan RACFs in the ACT. The extent to which these findings might be generalisable to RACFs in rural and remote localities is not yet known.

Furthermore, a consistent limitation for the mixed methods studies related to the low survey responses rates for the T2 collaboration survey and normalisation survey, meaning that there was limited external validity to these quantitative findings. It was also not possible to explore whether there was variation in the perceptions of different health professional groups. Despite the ongoing advertisement and distribution of these surveys, the second ACT COVID-19 lockdown, which commenced in August 2021, likely contributed to these low survey response rates. Thus, these quantitative findings may not be reflective of overall health care team member perceptions.

7.5 Key integrated finding from thesis

Figure 9 illustrates how this thesis's key integrated finding was synthesised.

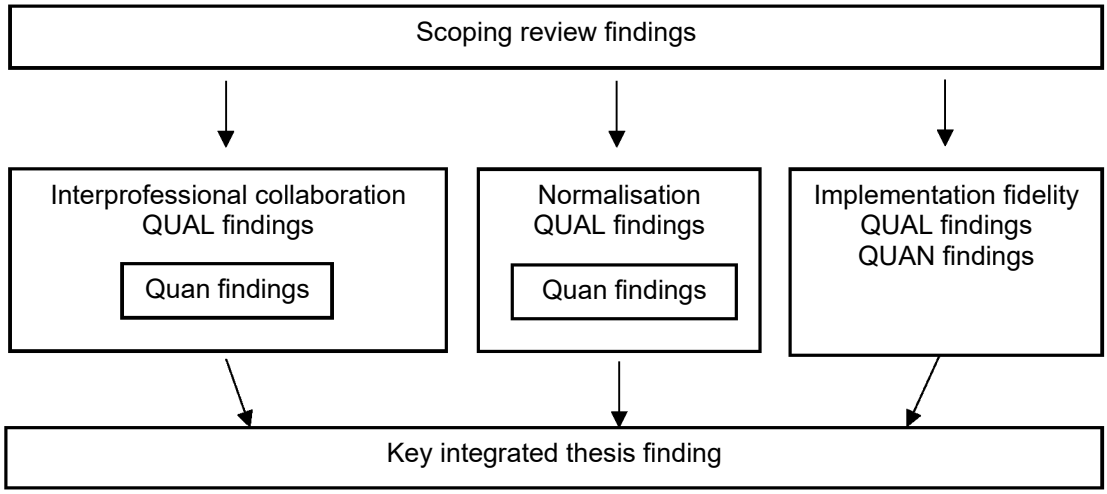

Figure 9: Synthesis of study findings to inform key integrated thesis finding

As previously mentioned, the scoping review was conducted to explore which evaluation approaches, evaluation tools and aspects of implementation were employed in the current Australia and international evaluated peer-reviewed pharmacist intervention in RACF literature. This scoping review identified potential gaps in the current literature which then informed the development of this thesis's subsequent research questions. This thesis's final three research questions related to evaluation of interprofessional collaboration, normalisation and implementation fidelity of the OSP intervention. Synthesis of the qualitative and

quantitative findings reported in Part B (Chapters 4-6) yielded the following key integrated thesis finding:

- Collaborative relationships between OSPs and prescribers, managers and nursing staff (health care team members) were crucial across each of the mixed methods studies.

This thesis demonstrated how these relationships could be established and maintained by OSPs who worked on-site at intervention RACFs, that these relationships were seldom disruptive of existing relationships, that these relationships supported OSPs to become part of routine practice within intervention RACFs and that the presence of these relationships, particularly when OSPs were pro-active in this regard, increased the likelihood of optimised OSP intervention delivery.

This key integrated thesis finding builds upon existing knowledge, particularly in relation to the importance of collaborative relationships to support good medication management (The Society of Hospital Pharmacists of Australia, 2022a) across multiple health settings, including real-world RACFs. While this finding was not necessarily unexpected, it was surprising that these collaborative relationships were not a key focus of the Australian Government Department of Health and Aged Care's aged care OSP measure consultation paper (Australian Department of Health and Aged Care, 2022b). Instead, the consultation paper only had one question for stakeholders in relation to collaborative relationships, which related to how the OSP could effectively collaborate with the health care team around health care setting transitions (Australian Department of Health and Aged Care, 2022b). Policy and practice implications in relation to these collaborative relationships will be discussed in section 7.6 and further research in relation to these collaborative relationships will be discussed in section 7.7.

7.6 Implications for policy and practice

Overall, the findings of this research are well aligned with the Royal Commission into Aged Care Quality and Safety's Recommendation 38 and Recommendation 64, which related to increased pharmacist involvement and increased access to medication reviews conducted by pharmacists (Royal Commission into Aged Care Quality and Safety, 2021). Following on from these recommendations, the Australian Government announced funding for OSPs in RACFs commencing from 2023 (Australian Department of Health and Aged Care, 2022i). This section

will now describe implications for policy and practice in relation to the roll out of OSPs in RACFs with a particular focus on OSP role development, OSP role development in the coming years, OSP training and related education programs, OSP workforce, model for employment, and implementation considerations.

OSP role development

As the OSP role is relatively new in Australia, understanding of the role and its potential (or perceived) benefits is nascent. Critical to the ongoing success of OSP role development in Australia is the need to establish a dialogue with RACF stakeholders such as prescribers, managers, nursing staff, OSPs, residents and family members, to allow for consensus on what the role can and should entail, as well as its potential benefits and drawbacks. This consensus approach is exemplified in the aged care OSP measure consultation paper which has sought feedback from interested stakeholders on OSP role development, training requirements, quality indicators and implementation approaches for the roll out of OSPs within RACFs (Australian Department of Health and Aged Care, 2022b). It is recommended that stakeholder feedback received from this consultation process be considered judiciously alongside the findings of this research and the PiRACF Study Evaluation Report.

While pharmacists have been funded to work with UK care homes from 2018 (NHS England, 2018), there is sparse grey and peer-reviewed literature available on their role. Thus, it is suggested that it may be more beneficial for development of the OSP role to be informed by the approaches taken and lessons learnt from implementation of related roles in Australia, such as general practice pharmacists (GPPs) who have become increasingly common over the last decade in Australia (Sudeshika et al., 2021). However, their role is still evolving and ongoing deficits have not yet been addressed at the policy and practice level (Sudeshika et al., 2021). For example, there remains variable awareness of the potential activities that GPPs could undertake and limited guidelines in place to support this role (Sudeshika et al., 2021). It is recommended that the *Guiding Principles for Medication Management in Residential Aged Care Facilities* (Australian Department of Health and Aged Care, 2022d) inform OSP role development.

Use of these guidelines would also support OSPs to tangibly assist RACFs to meet the new person-centred care and communicating about medicines guiding principles alongside revised

clinical governance of medication management, and evaluation of quality improvement in medication management guiding principles (Australian Department of Health and Aged Care, 2022d). OSP involvement in clinical governance and working collaboratively with GPs is consistent with the OSP key intervention activities described in section 1.7 with these specific activities supported by the Australian Medical Association (AMA), the peak professional body for doctors in Australia (Australian Medical Association, 2022a).

OSP role development in the coming years

If the OSP role within RACFs becomes established in the Australian health care system, further development of the OSP role could be considered in the coming years. This could relate to increased OSP involvement in supporting residents at end-of-life, such as participation in Palliative Care Needs Rounds and documentation of advance care plans, activities that were examined in a quasi-experimental study conducted in rural RACFs in New South Wales (Rainsford et al., 2020), and testing the feasibility and acceptability of prescribing by OSPs. Following the Pharmacy Board of Australia's position statement that there are no regulatory barriers to pharmacist prescribing (Pharmacy Board of Australia, 2019), pilot trials for community pharmacists to prescribe medications have commenced, or have been announced, in some Australian states, e.g. New South Wales, Queensland and Victoria (NSW Health, 2022; Queensland Health, 2020; The Pharmacy Guild of Australia, 2022). To date, the AMA is strongly opposed to pharmacists prescribing medications in any health setting, with this position reaffirmed in their response to the aged care OSP measure consultation paper (Australian Medical Association, 2022a).

Should prescribing OSPs in Australia be considered in the future, this model of care could potentially be informed by a new pharmacist model of care for UK care homes explored as part of the Care Home Independent Prescribing Pharmacist Study (CHIPPS). In this study, a pharmacist-independent prescriber was responsible for overall medication management of residents living in RACFs alongside a GP (Inch et al., 2019). It would also be beneficial for any further development of the OSP role to be informed by the approaches taken and lessons learnt from implementation of nurse practitioners (NPs) in Australia.

NPs were first introduced in the US in the 1960s (Savrin, 2009), with development of the NP role in Australia ongoing (Elsom et al., 2009). Similar to the British Medical Association's

opposition to expanding prescribing rights to UK nurses (and pharmacists), in 2005, the AMA's position was that they opposed an independent NP role who prescribed medication (Elsom et al., 2009). Despite this opposition there has been significant investment in embedding NPs into the Australian health care system in the last 20 years (Australian College of Nurse Practitioners, 2020), including Australian Government funding of the four-year Nurse Practitioner – Aged Care Models of Practice Initiative, as well as large-scale evaluation of that initiative's effectiveness (Clark et al., 2015). In late 2021, the Australian Government Department of Health and Aged Care sought feedback on the development of a Nurse Practitioner 10 Year Plan, with a consultation analysis report prepared in late 2022 (Australian Department of Health and Aged Care, 2022h).

However, ongoing challenges remain in relation to implementation of NPs, because each Australian state/territory's legislation needs to change to allow for NP prescribing (Elsom et al., 2009). As a consequence, NP role development is at different stages across Australia (Elsom et al., 2009). Additional challenges relate to the ongoing limited funding models available for NPs to work within aged care, and persistent misunderstanding of the NP role by other health professionals, e.g. other prescribers (Australian College of Nurse Practitioners, 2020). Promisingly though, in 2022, the AMA released an updated Nurse Practitioners position statement where the importance of NPs working collaboratively as part of a GP-led primary health care team was acknowledged (Australian Medical Association, 2022b).

This means that if further development of the OSP role relates to prescribing (and deprescribing), it is important to recognise that the barriers that NPs have experienced, and continue to face, will likely also impact OSP prescribers (i.e. state/territory legislation changes required, funding models available, misunderstanding of the OSP prescriber role from other health professionals, and opposition from peak health bodies, such as the AMA), until the value of the role is established within the context of existing health care teams.

OSP training and related education programs

The grey and peer-reviewed literature available on the training needs of pharmacists funded to work with UK care homes is limited. The only article identified was in relation to the evaluation of a training program for pharmacist-independent prescribers working with UK care homes – a new pharmacist model of care (Birt et al., 2022). However, as this training program was for

pharmacist-independent prescribers, its applicability to the current Australian RACF setting is limited. In contrast, there is international literature available on GPP training needs (Centre for Pharmacy Postgraduate Education, 2016; Farrell et al., 2012) and an established body of Australian experts in relation to GPP training needs (Benson et al., 2020).

In time, when there is a body of experts with expertise on OSPs within Australian RACFs, it is strongly encouraged that consensus be reached on OSP educational needs through undertaking either a Nominal Group Technique or Delphi Technique (McMillan et al., 2016). At this stage though, it would likely be beneficial for OSPs to complete the Pharmaceutical Society of Australia (PSA) Foundation Training Program (or equivalent) and undertake training to become an accredited pharmacist, broadly consistent with the approach taken in the PiRACF study. The requirement for pharmacists to be accredited is supported by the AMA (Australian Medical Association, 2022a).

The Department of Health and Aged Care has recently consulted with stakeholders on the Redesign of the Quality Use of Diagnostics, Therapeutics and Pathology Program (Australian Department of Health and Aged Care, 2022j). As part of this redesign, NPS MedicineWise will cease operations, with the provision of education programs for health professionals and consumers anticipated to occur via a competitive grant process commencing from 2023 (Australian Department of Health and Aged Care, 2022j; NPS MedicineWise, 2022).

It is recommended that peak pharmacy organisations and universities consider applying for the Health Professional Education grant to support the co-design of educational activities, which would further support collaborative relationships between OSPs and health care team members within RACFs. This recommendation is underpinned by this thesis's key integrated finding. It is also recommended that peak pharmacy organisations and consumer organisations such as Council on the Ageing, the peak organisation for older Australians, consider applying for the Quality Use of Medicines Consumer Health Literacy grant to support the co-design of consumer health literacy within RACFs. The findings reported in Part B (Chapter 5) suggest a particular focus on increasing health literacy with regards to medications could potentially help residents living in RACFs and their family members to seek out the OSP in their respective RACFs and to speak with them about medications. With this increased medication knowledge, they might then feel more confident and empowered when discussing medication management decisions with other health care team members (e.g. GPs). This recommendation is well aligned with the

revised National Medicines Policy's first enabler, which emphasises the importance of supporting health literacy in order to increase the knowledge and confidence of Australians when it comes to making informed decisions, inclusive of medication-related decisions (Australian Department of Health and Aged Care, 2022g).

OSP workforce

As of September 2022, there were approximately 35,173 registered pharmacists working in Australia (Pharmacy Board of Australia, 2022). The aged care OSP measure consultation paper indicated that one pharmacist would be employed full-time per 250 RACF beds on a pro-rata basis (Australian Department of Health and Aged Care, 2022b). This rate is slightly higher than the recommended one full-time equivalent pharmacist per 200 RACF beds proposed by the Society of Hospital Pharmacists of Australia (SHPA), the peak professional body of Australian hospital pharmacists (The Society of Hospital Pharmacists of Australia, 2022a). Based upon the total number of residents living in RACFs (as of the 30 June 2022, 180,750) (Australian Department of Health and Aged Care, 2022a), to meet the anticipated RACF demand set out in the consultation paper, at least 2% of the total registered pharmacist workforce in Australia would need to become OSPs.

Although the aged care OSP measure consultation paper proposed a staggered goal of OSPs working in 30% of RACFs in the first implementation year followed by 60% in the second year and 80% in the third year (Australian Department of Health and Aged Care, 2022b), this goal may still be difficult to achieve for a number of reasons. Of the pharmacists surveyed in the recent Census and Aged Care Workforce Census, only 1% provided pharmacist services to RACFs (Health Policy Analysis, 2022). While it is possible that pharmacists who previously provided RMMR and QUM services to RACFs may be interested in working as OSPs in RACFs, this cannot be assumed given the differences between how these pharmacist services and the OSP role will be operationalised and delivered in RACFs

It is anticipated that work undertaken by Monash University, University of Western Australia and University of Sydney academics, which commenced in late 2022, in the form of a pharmacist survey, may help to inform the extent of Australian pharmacists' interest and perceived preparedness to work as OSPs within Australian RACFs. In the interim, the AMA has suggested that one approach to address the potential OSP workforce demand issue,

particularly in rural and remote areas, would be for hospital pharmacists to help meet this demand (Australian Medical Association, 2022a). While the hospital pharmacist workforce is Australia's fastest-growing pharmacy sector (The Society of Hospital Pharmacists of Australia, 2022b), to date, there remains a nationwide shortage of hospital (and community) pharmacists across all states/territories and localities (National Skills Commission, 2022). Feedback on the aged care OSP measure consultation paper from interested stakeholders, particularly, the SHPA, would be critical to help identify a potential way forward to meet the anticipated OSP workforce demand.

Model of employment

The Australian Government's Workforce Incentive Program – Practice Stream (Services Australia, 2022) provides for some funding to support general practices to employ pharmacists. Historically, the lack of a national funding model for employment of integrated pharmacists working in Australian general practices has been a key barrier for this role (Sudeshika et al., 2021). A recent qualitative study conducted in Ireland similarly identified GPP funding concerns (Hurley et al., 2022). By contrast, the roll out of OSPs to work within Australian RACFs will be nationally funded for four years (Australian Department of Health and Aged Care, 2022b). The aged care OSP measure consultation paper sought stakeholder feedback on the model of employment for OSPs i.e. whether this funding should be provided directly to RACFs or be coordinated through Primary Health Networks (PHNs) (Australian Department of Health and Aged Care, 2022b).

As part of the PiRACF study, OSPs were directly employed by RACFs, and there is anecdotal evidence that a small number of ACT RACFs have employed OSPs following the 2017 pilot study and PiRACF study. However, this does not mean that a model for employment where funding is directed to RACFs should be automatically considered a feasible model for employment for the roll out of OSPs within RACFs across Australia. Likewise, while the AMA is supportive of a model of employment where funding is coordinated through PHNs (Australian Medical Association, 2022a), and while the PiRACF study was funded by the ACT's PHN through the Australian Government's PHN Program, this option also requires further consideration. Irrespective of whichever model for employment is selected for the roll out of OSPs within Australian RACFs, critical elements of the OSP intervention outlined in the PiRACF study should be maintained i.e. the OSP working on-site at the RACF (wherever

possible), the OSP being accessible to RACF staff and residents, and the OSP being able to build collaborative relationships with RACF health care team members (Kosari et al., 2021). Given the possibility that a national model of employment could soon be in place for integrated pharmacists working in Aboriginal Community Controlled Health Organisations (ACCHOs) (Medical Services Advisory Committee, 2022), it is strongly recommended that any decision on the national funding model for integrated pharmacists working in RACFs be consistent, wherever possible, with those planned for integrated pharmacists working in ACCHOs.

Implementation considerations

To further strengthen the roll out of OSPs within Australian RACFs, a suite of implementation considerations are outlined below. The findings reported in Part B (Chapter 6) support OSPs and RACF managers to optimise delivery of the OSP intervention through mechanisms such as tailored guidance documents and checklists, as well as initial and ongoing promotion of the OSP role with a focus on their potential beneficial impact and increasing awareness of the activities they could undertake within RACFs.

The findings reported in Part B (Chapter 4) support the need for RACF management to increase opportunities for OSPs and health care team members, particularly GPs, to establish relationships and work together. As part of the OSP roll out, irrespective of the RACF provider's organisational and management structure, it will be important for on-site RACF management to be empowered to optimise the potential role of an OSP within their respective RACF, particularly through supporting establishing relationships between OSPs and health care team members. The importance of establishing these relationships aligns with the findings of a qualitative study conducted in the UK which highlighted the importance of GPPs taking the time to develop relationships and building trust, which then supported positive outcomes such as decreased general practice staff workloads (Ryan et al., 2018). This recommendation is also consistent with this thesis's key integrated finding. Furthermore, the findings in Part B (Chapter 6) suggest that ongoing opportunities for OSPs to meet and support each other would likely assist with the national roll out. This could be fostered through development of a new community of practice for OSPs or through leveraging the PSA's existing Interdisciplinary Team-Based Care Community of Speciality Interest group (Pharmaceutical Society of Australia, 2020c).

Further exploration of how the national roll out could be practically implemented for rural and remote RACFs is required, and it is likely that some adjustments may be required. For example, OSPs may need to work across a number of smaller RACFs and work remotely in some limited circumstances due to the geographical distance between some rural and remote RACFs. Evaluation and monitoring of the OSP roll out, including the acceptability and whether the selected roll out model is sustainable, would also be beneficial.

7.7 Future research direction

This thesis identified some areas where further research would be helpful to progress understanding of the OSP role as well as the perceived (or potential) benefits of OSPs working within RACFs to help improve medication management.

The findings reported in Part B (Chapter 4) suggest that future research explore the sustainability of OSP and health care team collaborative relationships beyond the 12-month OSP intervention timeframe. It would be beneficial if this research could consider the OSP model of employment, and include a larger quantitative sample size to allow for comparison between the health care team groups. This recommendation is also consistent with this thesis's key integrated finding.

As integrated pharmacists working in general practices, ACCHOs and RACFs become increasingly common and established in Australia, there is more interest in exploring these integrated pharmacist roles beyond their impact on health outcomes. This is evidenced by Patel et al.'s qualitative systematic review protocol, which describes their intent to better understand the attitudes, perceptions and experiences associated with integration of pharmacists into multidisciplinary health care teams inclusive of primary, tertiary and RACF settings (Patel et al., 2020). In due course, it is recommended that researchers take the next logical research step and investigate the extent of pharmacist integration within, and potentially also across, these Australian health settings.

One possible approach to measuring pharmacist integration would be to use Rosen and colleagues' work which states that six activities are required to support integrated care, illustrated in Figure 10 (Rosen et al., 2012). Rosen et al.'s work was informed by previous research, in particular that by, Nolte and McKee and Fulop (Alakeson & Rosen, 2011). In their

systematic review, Hazen et al. (Hazen et al., 2018) assessed the degree of non-dispensing pharmacist integration in primary care settings using five of six activities described in Rosen et al.'s work (Rosen et al., 2012).

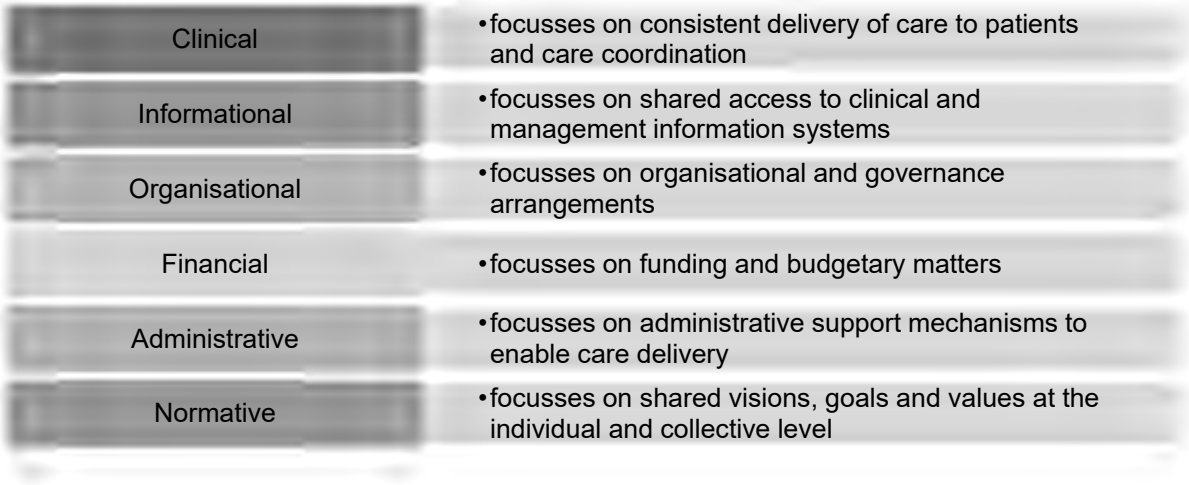

Figure 10: Six activities required to support integrated care (Rosen et al., 2012)

Person-centred care is a term commonly used in the current literature (Edvardsson et al., 2008; Meranius et al., 2020). It is the gold standard approach when providing health care and is an important component of high-quality health care (Australian Commission on Safety and Quality in Health Care, 2011; Edvardsson et al., 2008). Its importance in relation to medication management is clearly demonstrated by the inclusion of person-centred as the first principle of the revised National Medicines Policy (Australian Department of Health and Aged Care, 2022g) and as the first guiding principle in the revised *Guiding Principles for Medication Management in Residential Aged Care Facilities* (Australian Department of Health and Aged Care, 2022d).

While it has been proposed that involving older people in medication decision-making, consistent with a person-centred care approach, may help to reduce medication-related harm (Elliott & Booth, 2014), person-centred care has been sparsely explored to date within pharmacist interventions in RACFs. Thiruchelvam et al.'s systematic review has since recommended that pharmacist interventions in RACFs incorporate a person-centred care approach when seeking to optimise medication prescribing and use (Thiruchelvam et al., 2017). Thus, there would be merit in future research investigating whether the OSP intervention is consistent with a person-centred care approach. One possible approach would be to

qualitatively explore how person-centred care within the context of RACF medication management is understood by residents, family members, OSPs and health care team members.

7.8 Conclusion

Evaluation of key components of an OSP intervention, namely, interprofessional collaboration, normalisation and implementation fidelity, nested within the PiRACF study have supported an expanded understanding of the OSP role as well as the perceived (or potential) benefits of OSPs working within RACFs to help improve medication management.

Australia's population is ageing. Medication-related harm amongst residents living in RACFs remains an intractable problem and efforts to improve medication management within RACFs have been inadequate. Over the last few years there has been an accelerated focus on efforts to improve RACF medication management. One of the most recent Australian Government announcements seeking to improve RACF medication management related to funding the roll out of OSPs in RACFs commencing from 2023. Findings from this research are timely and they provide an original contribution to knowledge in relation to the relatively new role of OSPs within Australian RACFs.

The OSP role appears to be promising, as demonstrated by the findings of this research, which concluded that OSPs have the potential to support positive interprofessional collaborative care and become part of routine practice within RACFs, with the OSP intervention generally able to be delivered as intended in real-world RACFs. The results of this research can be used by decision makers, RACF providers, health professionals and researchers when considering policy and practice implications associated with roll out of OSPs within Australian RACFs and future OSP research studies. OSPs within RACFs have the real potential to support improved RACF medication management, which may help to minimise the extent of medication-related harm experienced by residents living in RACFs.

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Appendices

Appendix 1 – Participant Information Sheet – Residents and family members

Project Title

Integrating Pharmacists in Residential Aged Care Facility to improve the quality use of medicines.

Research team contact details

Dr Jane Koerner, Associate Professor Sam Kosari, Professor Mark Naunton, Miranda Batten
Faculty of Health, Health Research Institute, University of Canberra
Phone: 6201 5250, 6201 2158, 6201 2462
Email: Jane.Koerner@canberra.edu.au, Sam.Kosari@canberra.edu.au, Mark.Naunton@canberra.edu.au, Miranda.Batten@canberra.edu.au

Project Aim

The aim of this research is to assess the impact of integrating pharmacists into residential aged care facilities (RACFs) to improve medication management.

General Outline of the Project

The study will examine whether a new model of care in RACFs, with an on-site pharmacist working alongside nursing and other staff, will improve medication management and reduce medication related harm and hospitalisation. The study is funded by the Capital Health Network through the ACTs Primary Health Program.

Participant Involvement

You are invited to participate in this study. Please select one or both of the below items that you agree to participate in:

□ Undertake a brief (20 minute) survey to understand your experience interacting with the on-site pharmacist

□ Undertake a brief (20 – 50 minute) interview with one of our research staff asking in more detail about your experience interacting with the on-site pharmacist.

Anticipated Benefits of the Project

There may be no direct benefits to you as a participant completing the survey, however the experiences of residents and family members interacting with pharmacists in this new model of care will be important feedback for further development of this role.

There will be a small financial incentive for you as an interview participant in the form of an on-line gift card voucher of $20. This small financial incentive is provided in recognition of your time and efforts. The electronic gift card voucher will be sent to interview participants after their interview.

Risks

There is no anticipated risk associated in participating in this study.

Withdrawal
Participation in the research is completely voluntary and participants may, without any penalty, refuse to answer a question, decline to take part or withdraw at any time without providing an explanation. If you choose to withdraw, you may request that information about your, collected for the purpose of this project, be destroyed. If you wish to withdraw, you can do this by contacting the researchers – see details on page 1.

Confidentiality
All data will be treated in strict confidence. Only the research team will have access to the information that you provide, and information that you provide will be used for the purpose of this study only. The research outcomes may be presented at conferences and written up for publication in scientific peer-reviewed journals. However, in all these publications, no personal identifying details will be published.

Data Storage
The information collected will be stored securely on a password protected computer throughout the project and then stored at the University of Canberra (UC) for the required five-year period (as per NHMRC guidelines) after which it will be destroyed according to university protocols.

Ethics Committee Clearance
The project has been approved by the UC Human Research Ethics Committee (HREC –2007).

Queries and Concerns
Queries or concerns regarding the research can be directed to the researchers. Their contact details are at the top of this form. You can also contact the University of Canberra's Research Ethics & Integrity Unit. You can contact Dr Anesh Nair via phone 02 6201 5220 or email humanethicscommittee@canberra.edu.au.

If you would like some guidance on the questions you could ask about your participation please refer to the Participants' Guide located at http://www.canberra.edu.au/ucresearch/attachments/pdf/a-m/Agreeing-to-participate-in-research.pdf

Consent Form- residents and family members
Participant copy

Project Title

Integrating Pharmacists in Residential Aged Care Facilities to improve the quality use of medicines.

Research team contact details:
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1. I have read the Participant information Form and I agree to take part in the study.
2. I understand that I will be given a copy of this signed and dated Informed Consent Form and Participant Information Sheet. I have received an explanation of the nature, purpose, duration and foreseeable effects of the study and what I will be expected to do. The possible risks and benefits of the study have been explained to me. I was given time and opportunity to inquire about the trial and all my questions were answered to my satisfaction.
3. I am aware that the University of Canberra Human Research Ethics Committee have subjected this study for review and have granted approval.
4. I understand that I will be required to (please select one or both items as you prefer):

□ Undertake a brief (20 minute) survey to understand your experience interacting with the on-site pharmacist

□ Undertake a brief (20 – 50 minute) interview with one of our research staff asking in more detail about your experience interacting with the on-site pharmacist.

5. I understand that I am free to withdraw from the study at any time, without the need to justify my decision.
6. I agree that the results of the study may be published or presented, however my name and contact details will be kept confidential.
7. I understand that the research will be conducted in accordance with the Declaration of Helsinki, NH&MRC Guidelines and applicable privacy laws.

I voluntarily consent to participate in this study:

_____Participant's Name, Signature and Date

I have explained this study and the implications of participating in it to this volunteer and I believe that the consent is informed and that the participant understands what is involved in participating in the study. The participant consented to participate by signing and dating

_____ Researcher Signature and Date

I would like to receive a copy of the summary report from this study and consent to you using my email address to send me the report: Yes/No

Email address_____

Consent Form- residents and family members
Study copy

Project Title

Integrating Pharmacists in Residential Aged Care Facilities to improve the quality use of medicines.

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_____ Researcher Signature and Date

I would like to receive a copy of the summary report from this study and consent to you using my email address to send me the report: Yes/No

Email address_____

Appendix 2 – Participant Information Sheet – on-site pharmacists

Project Title

Integrating Pharmacists into Residential Aged Care Facilities to improve the quality use of medicines.

Research team contact details

Dr Jane Koerner, Associate Professor Sam Kosari, Professor Mark Naunton, Miranda Batten
Faculty of Health, Health Research Institute, University of Canberra
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Project Aim

The aim of this research is to assess the impact of integrating pharmacists into residential aged care facilities (RACFs) on improving medication management.

General Outline of the Project

The study will examine whether a new model of care in RACFs, with an on-site pharmacist working alongside nursing and other staff, will improve medication management and reduce medication related hospitalisations. The study is funded by the Capital Health Network through the ACTs Primary Health Program.

Participant Involvement

You are invited to participate in this study. If you agree to participate you will be asked to:

- □ Undertake activities within your usual scope of practice including: medications reviews, medications rounds, update resident's medications information, medications audits, education with RACF staff and report your activities to the research team.
- □ Attend training sessions for briefings about the study.
- □ Complete activity diaries that document daily activities and time taken.
- □ Participate in an online discussion board through the University of Canberra's Enterprise Microsoft suite. The online forum is a forum for pharmacists to connect each other and share their experiences. Broad themes discussed in the online forum will be captured by the research team to understand the issues faced by pharmacists in implementing the intervention.
- □ Undertake two brief (20 minute) surveys to understand collaboration.
- □ Undertake one brief (20 minute) survey to understand integration.
- □ Undertake one – two interviews (45 – 60 minutes each) with research staff about how it was to be involved in the study, how much the model was adhered to, and the potential for wider implementation.

Anticipated Benefits of the Project

There may be no direct benefits to you as a participant in this study.

Risks

There is no anticipated risk associated in participating in this study beyond your usual role as a pharmacist.

Withdrawal

Participation in the research is completely voluntary and participants may, without any penalty, refuse to answer a question, decline to take part or withdraw at any time without providing an explanation. If you choose to withdraw, you may request that information about your, collected for the purpose of this project, be destroyed. If you wish to withdraw, you can do this by contacting the researchers – see details on page 1.

Confidentiality

All data will be treated in strict confidence. Only the research team will have access to the information that you provide, and information that you provide will be used for the purpose of this study only. The research outcomes may be presented at conferences and written up for publication. However, in all these publications, no personal identifying details will be presented.

Data Storage

The information collected will be stored securely on a password protected computer throughout the project and then stored at the University of Canberra (UC) for the required five-year period (as per NHMRC guidelines) after which it will be destroyed according to university protocols. The online discussion board will be protected by The University of Canberra's Digital Information and Communications Technology firewall. This means that non-authorised individuals are not able to access devices or data.

Ethics Committee Clearance

The project has been approved by the UC Human Research Ethics Committee (HREC –2007).

Queries and Concerns

Queries or concerns regarding the research can be directed to the researchers. Their contact details are at the top of this form. You can also contact the University of Canberra's Research Ethics & Integrity Unit. You can either contact Ms Maryanne Simpson via phone 02 6206 3916, Dr Anesh Nair via phone 02 6201 5220 or email humanethicscommittee@canberra.edu.au.

If you would like some guidance on the questions you could ask about your participation please refer to the Participants' Guide located at http://www.canberra.edu.au/ucresearch/attachments/pdf/a-m/Agreeing-to-participate-in-research.pdf

Consent Form- on-site pharmacists
Participant copy

Project Title

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Research team contact details:
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3. I am aware that the University of Canberra Human Research Ethics Committee have subjected this study for review and have granted approval.
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□ Undertake activities within your usual scope of practice including: medications reviews, medications rounds, update resident's medications information, medications audits, education with RACF staff and report your activities to the research team.
□ Attend training sessions for briefings about the study
□ Complete activity diaries that document daily activities and time taken.
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□ Undertake one – two interviews (45 – 60 minutes each) with research staff about how it was to be involved in the study, how much the model was adhered to, and the potential for wider implementation.

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6. I agree that the results of the study may be published or presented, however my name and contact details will be kept confidential.
7. I understand that the research will be conducted in accordance with the Declaration of Helsinki, NH&MRC Guidelines and applicable privacy laws.

I voluntarily consent to participate in this study

_____Participant's Name, Signature and Date

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_____ Researcher Signature and Date

I would like to receive a copy of the summary report from this study and consent to you using my email address to send me the report: Yes/No
Email address_____

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Integrating Pharmacists in Residential Aged Care Facilities to improve the quality use of medicine.

Research team contact details:
Dr Jane Koerner, Associate Professor Sam Kosari, Professor Mark Naunton, Miranda Batten
Faculty of Health, Health Research Institute, University of Canberra
Phone: 6201 5250, 6201 2158, 6201 2462
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1. I have read the Participant information Form and I agree to take part in the study.
2. I understand that I will be given a copy of this signed and dated Informed Consent Form and Participant Information Sheet. I have received an explanation of the nature, purpose, duration and foreseeable effects of the study and what I will be expected to do. The possible risks and benefits of the study have been explained to me. I was given time and opportunity to inquire about the study and all my questions were answered to my satisfaction.
3. I am aware that the University of Canberra Human Research Ethics Committee have subjected this study for review and have granted approval.
4. I understand that I will be required to:

□ Undertake activities within your usual scope of practice including: medications reviews, medications rounds, update resident's medications information, medications audits, education with RACF staff and report your activities to the research team.
□ Attend training sessions for briefings about the study
□ Complete activity diaries that document daily activities and time taken.
□ Participate in an online discussion board through the University of Canberra's Enterprise Microsoft suite. The online forum is a forum for pharmacists to connect each other and share their experiences. Broad themes discussed in the online forum will be captured by the research team to understand the issues faced by pharmacists in implementing the intervention.
□ Undertake two brief (20 minute) surveys to understand collaboration.
□ Undertake one – two interviews (45 – 60 minutes each) with research staff about how it was to be involved in the study, how much the model was adhered to, and the potential for wider implementation.

5. I understand that I am free to withdraw from the study at any time, without the need to justify my decision.
6. I agree that the results of the study may be published or presented, however my name and contact details will be kept confidential.
7. I understand that the research will be conducted in accordance with the Declaration of Helsinki, NH&MRC Guidelines and applicable privacy laws.

I voluntarily consent to participate in this study

_____Participant's Name, Signature and Date

I have explained this study and the implications of participating in it to this participant and I believe that the consent is informed and that the participant understands what is involved in participating in the study. The participant consented to participate by signing and dating

_____ Researcher Signature and Date

I would like to receive a copy of the summary report from this study and consent to you using my email address to send me the report: Yes/No
Email address_____

Appendix 3 – Participant Information Sheet – RACF staff, Prescribers (including GPs, NPs, geriatricians & specialists) and Health Professionals

Project Title

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Project Aim

The aim of this research is to assess the impact of integrating pharmacists into residential aged care facilities (RACFs) on improving medication management.

General Outline of the Project

The study will examine whether a new model of care in RACFs, with an on-site pharmacist working alongside nursing and other staff, will improve medication management and reduce medication related hospitalisations. The study is funded by the Capital Health Network through the ACTs Primary Health Program.

Participant Involvement

You are invited to participate in this study. If you agree to participate you will be asked to:

- □ Undertake a brief (10 minute) survey to understand your relationship with the on-site pharmacist – this survey will be conducted at two time points and undertake a brief (20 minute) survey to understand how much the model was integrated

- □ Undertake an interview (45 – 60 minutes) with research staff about what you think about the addition of an onsite pharmacist to this RACF.

Anticipated Benefits of the Project

There may be no direct benefits to you as a participant in this study, however the experiences of health care professionals working alongside pharmacists in this new model of care will be important feedback for further development of this role.

Risks

There is no anticipated risk associated in participating in this study.

Withdrawal

Participation in the research is completely voluntary and participants may, without any penalty, refuse to answer a question, decline to take part or withdraw at any time without providing an explanation. If you choose to withdraw, you may request that information about your, collected for the purpose of this project, be destroyed. If you wish to withdraw, you can do this by contacting the researchers – see details on page 1.

Confidentiality
All data will be treated in strict confidence. Only the research team will have access to the information that you provide, and information that you provide will be used for the purpose of this study only. The research outcomes may be presented at conferences and written up for publication. However, in all these publications, no personal identifying details will be presented.

Data Storage
The information collected will be stored securely on a password protected computer throughout the project and then stored at the University of Canberra (UC) for the required five-year period (as per NHMRC guidelines) after which it will be destroyed according to university protocols.

Ethics Committee Clearance
The project has been approved by the UC Human Research Ethics Committee (HREC –2007).

Queries and Concerns
Queries or concerns regarding the research can be directed to the researchers. Their contact details are at the top of this form. You can also contact the University of Canberra's Research Ethics & Integrity Unit. You can contact Dr Anesh Nair via phone 02 6201 5220 or email humanethicscommittee@canberra.edu.au.

If you would like some guidance on the questions you could ask about your participation please refer to the Participants' Guide located at http://www.canberra.edu.au/ucresearch/attachments/pdf/a-m/Agreeing-to-participate-in-research.pdf

Consent Form- RACF staff, Prescribers (including GPs, Nurse Practitioners, geriatricians & specialists) and Health Professionals

Participant copy

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3. I am aware that the University of Canberra Human Research Ethics Committee have subjected this study for review and have granted approval.
4. I understand that I will be required to:
   - □ Undertake a brief (10 minute) survey to understand your relationship with the on-site pharmacist – this survey will be conducted at two time points and undertake a brief (20 minute) survey to understand how much the model was integrated
   - □ Undertake an interview (45 – 60 minutes) with research staff about what you think about the addition of an onsite pharmacist to this RACF.

5. I understand that I am free to withdraw from the study at any time, without the need to justify my decision.
6. I agree that the results of the study may be published or presented, however my name and contact details will be kept confidential.
7. I understand that the research will be conducted in accordance with the Declaration of Helsinki, NH&MRC Guidelines and applicable privacy laws.

I voluntarily consent to participate in this study

_____Participant's Name, Signature and Date

I have explained this study and the implications of participating in it to this participant and I believe that the consent is informed and that the participant understands what is involved in participating in the study. The participant consented to participate by signing and dating

_____ Researcher Signature and Date

I would like to receive a copy of the summary report from this study and consent to you using my email address to send me the report: Yes/No

Email address_____

Consent Form- RACF staff, Prescribers (including GPs, Nurse Practitioners, geriatricians & specialists) and Health Professionals

Study copy

Project Title

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   - □ Undertake a brief (10 minute) survey to understand your relationship with the on-site pharmacist – this survey will be conducted at two time points and undertake a brief (20 minute) survey to understand how much the model was integrated
   - □ Undertake an interview (45 – 60 minutes) with research staff about what you think about the addition of an onsite pharmacist to this RACF.

5. I understand that I am free to withdraw from the study at any time, without the need to justify my decision.
6. I agree that the results of the study may be published or presented, however my name and contact details will be kept confidential.
7. I understand that the research will be conducted in accordance with the Declaration of Helsinki, NH&MRC Guidelines and applicable privacy laws.

I voluntarily consent to participate in this study

_____Participant's Name, Signature and Date

I have explained this study and the implications of participating in it to this participant and I believe that the consent is informed and that the participant understands what is involved in participating in the study. The participant consented to participate by signing and dating

_____ Researcher Signature and Date

I would like to receive a copy of the summary report from this study and consent to you using my email address to send me the report: Yes/No

Email address_____

Appendix 4 – Collaboration survey

Collaboration survey

Thank you for your interest in the *Pharmacists Integrated into Residential Aged Care Facilities* study collaboration survey. This survey looks at collaboration between the on-site pharmacist working in a residential aged care facility, RACF staff and health care team members (General Practitioners, prescribers and allied health professionals).

This survey will ask you about your background and your relationship with the on-site pharmacist during their first three months working at a residential aged care facility. The survey will take approximately 5 – 10 minutes to complete.

Your participation is voluntary. There are no financial incentives provided to participate in this study. You can choose not to participate at any time without penalty or disadvantage.

Your information will be treated confidentially. All responses will be de-identified and reported as a group. Reports published will not identify individuals or facilities participating in the research. The results from this study will be presented at conferences and published in a scientific journal.

Ethical consideration. The study has been approved by the Human Research Ethics Committee of the University of Canberra in accordance with the guidelines of the Ethics Committee and the NHMRC. All participants can discuss their participation in this study with the Chief Investigator by calling 02 6201 2158 or e-mailing sam.kosari@canberra.edu.au. If any participant would like to speak with an Officer of the University not involved in the study, you may contact the Research Ethics & Integrity Advisor on 02 6206 3916 and quote the project number 2007.

If you consent to participate in this survey, please select 'I consent to participate in this survey' below.

- [ ] I consent to participate in this survey.

Q1 What is your age in years?

- ( ) 18 - 24
- ( ) 25 - 34
- ( ) 35 - 44
- ( ) 45 - 54
- ( ) 55 - 64
- ( ) 65 - 74
- ( ) 75 - 84
- ( ) 85 or older

Q2 What is your gender?

- Male
- Female
- Other
- Prefer not to say

Q3 What is your current role?

- I am involved in managing the on-site pharmacist
- I am involved in working with the on-site pharmacist
- Other _____

Q4 How many years have you worked with (or in) this facility?

- Less than 1 year
- 2 - 4 years
- 5 - 9 years
- 10 - 14 years
- Over 15 years

Q5 How many years of experience do you have working in residential aged care?

- Less than 1 year
- 2 - 4 years
- 5 - 9 years
- 10 - 14 years
- Over 15 years

Q6 What is your profession?

- Administrative
- Allied Health
- General Practitioner
- Nursing, please specify your classification e.g. RN, EN, NP_____
- Care staff
- Other _____

Q7 How many years of experience do you have in your profession?

- Less than 1 year
- 2 - 4 years
- 5 - 9 years
- 10 - 14 years
- Over 15 years

Q8 What qualifications do you hold?

- Not applicable
- Certificate
- Diploma
- Bachelor degree
- Graduate Certificate
- Graduate Diploma
- Master degree
- Other _____

Q9 Please think about your interactions with the on-site pharmacist during their first three months and answer the questions below by selecting from the button options.

	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree	Not applicable
When providing resident care which relates to medications, I need this on-site pharmacist as much as this on-site pharmacist needs me								
This on-site pharmacist is credible								
My interactions with this on-site pharmacist are characterised by open communication by both parties								
I can count on this on-site pharmacist to do what he/she says								
This on-site pharmacist depends on me as much as I depend on him/her when providing resident care which relates to medications								

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	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree	Not applicable
This on-site pharmacist and I are mutually dependent on each other when providing resident care which relates to medications								
This on-site pharmacist and I negotiate to come to agreement on our activities in managing resident care which relates to medications								
I will work with this on-site pharmacist to overcome disagreements on his/her role in managing resident care								
I intend to keep working together with this on-site pharmacist								
I trust this on-site pharmacist's medication expertise								

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	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree	Not applicable
Communication between this on-site pharmacist and myself is two-way								
This on-site pharmacist has spent time trying to learn about how he/she can help me provide better resident care in relation to medications								
This on-site pharmacist has provided information about a specific resident								
This on-site pharmacist has shown an interest in helping me improve my practice in relation to medications								
I have provided information to the on-site pharmacist about a specific resident								

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	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree	Not applicable
I have contacted the on-site pharmacist about specific medication queries								

Q10 What is the first three (3) letters of your favourite colour and the name of the first street you lived in when you went to primary school?

Note: This is to link your answers to the follow up collaboration survey in 2021.

e.g. If your favourite colour is blue and you lived on Northbourne Avenue when you started primary school, then please write the first three letters "blu" and "Nor" in the provided box (bluNor)

_____

Thank you for participating in this survey.

Please return your completed survey via email to racfstudy@canberra.edu.au or in the 'Pharmacists in RACF study survey box' located at your facility.

If you would like to receive a copy of the summary report from this study, please email racfstudy@canberra.edu.au

Appendix 5 – Collaboration and integration survey

Collaboration and integration survey

Thank you for your interest in the Pharmacists Integrated into Residential Aged Care Facilities study collaboration and integration survey. This survey looks at collaboration and integration between the on-site pharmacist, facility staff and health care team members.

This survey will ask you about your background and experience working with the on-site pharmacist. The survey will take approximately 25 - 30 minutes to complete.

Your participation is voluntary. There are no financial incentives provided to participate in this study. You can choose not to participate at any time without penalty or disadvantage.

Your information will be treated confidentially. All responses will be de-identified and reported as a group. Reports published will not identify individuals or facilities participating in the research. The results from this study will be presented at conferences and published in a scientific journal.

Ethical consideration. The study has been approved by the Human Research Ethics Committee of the University of Canberra in accordance with the guidelines of the Ethics Committee and the NHMRC. All participants can discuss their participation in this study with the Chief Investigator by calling 02 6201 2158 or e-mailing sam.kosari@canberra.edu.au. If any participant would like to speak with an Officer of the University not involved in the study, you may contact the Research Ethics & Integrity Advisor on 02 6206 3916 and quote the project number 2007.

If you consent to participate in this survey, please select 'I consent to participate in this survey' below.

- ○ I consent to participate in this survey.

Q1 What is your age in years?

- ○ 18 - 24
- ○ 25 - 34
- ○ 35 - 44
- ○ 45 - 54
- ○ 55 - 64
- ○ 65 - 74
- ○ 75 - 84
- ○ 85 or older

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Q2 What is your gender?

- Male
- Female
- Other
- Prefer not to say

Q3 What is your current role?

- I am involved in managing the on-site pharmacist
- I am involved in working with the on-site pharmacist
- Other _____

Q4 How many years have you worked with (or in) this facility?

- Less than 1 year
- 2 - 4 years
- 5 - 9 years
- 10 - 14 years
- Over 15 years

Q5 How many years of experience do you have working in residential aged care?

- Less than 1 year
- 2 - 4 years
- 5 - 9 years
- 10 - 14 years
- Over 15 years

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Q6 What is your profession?

- Administrative
- Allied Health
- General Practitioner
- Nursing, please specify your classification e.g. RN, EN, NP_____
- Care staff
- Other _____

Q7 How many years of experience do you have in your profession?

- Less than 1 year
- 2 - 4 years
- 5 - 9 years
- 10 - 14 years
- Over 15 years

Q8 What qualifications do you hold?

- [ ] Not applicable
- [ ] Certificate
- [ ] Diploma
- [ ] Bachelor degree
- [ ] Graduate Certificate or Diploma
- [ ] Master degree
- [ ] Other _____

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Q9 Please think about your interactions with the on-site pharmacist and answer the questions below by selecting from the button options.

	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree	Not applicable
When providing resident care which relates to medications, I need this on-site pharmacist as much as this on-site pharmacist needs me								
This on-site pharmacist is credible								
My interactions with this on-site pharmacist are characterised by open communication by both parties								
I can count on this on-site pharmacist to do what he/she says								
This on-site pharmacist depends on me as much as I depend on him/her when providing resident care which relates to medications								

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	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree	Not applicable
This on-site pharmacist and I are mutually dependent on each other when providing resident care which relates to medications								
This on-site pharmacist and I negotiate to come to agreement on our activities in managing resident care which relates to medications								
I will work with this on-site pharmacist to overcome disagreements on his/her role in managing resident care								
I intend to keep working together with this on-site pharmacist								
I trust this on-site pharmacist's medication expertise								

	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree	Not applicable
Communication between this on-site pharmacist and myself is two-way								
This on-site pharmacist has spent time trying to learn about how he/she can help me provide better resident care in relation to medications								
This on-site pharmacist has provided information about a specific resident								
This on-site pharmacist has shown an interest in helping me improve my practice in relation to medications								
I have provided information to the on-site pharmacist about a specific resident								

	Very strongly disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Very strongly agree	Not applicable
I have contacted the on-site pharmacist about specific medication queries	○	○	○	○	○	○	○	○

Q10 Please think about your experience working with the on-site pharmacist and answer the questions below by circling the number that best suits your response.

	Not at all familiar										Feels completely familiar
How familiar does it feel to have the on-site pharmacist working at this facility?	0	1	2	3	4	5	6	7	8	9	10
Do you feel that working with the on-site pharmacist ***is currently*** a normal part of your work?	0	1	2	3	4	5	6	7	8	9	10
Do you feel that working with the on-site pharmacist ***will become*** a normal part of your work?	0	1	2	3	4	5	6	7	8	9	10

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Q12 Please think about your experience working with the on-site pharmacist and answer the questions below by selecting from the button options.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strong disagree	Not relevant to my role	Not relevant at this stage	Not applicable
I can see how having the on-site pharmacist at this facility differs from not having an on-site pharmacist								
My colleagues and I have a shared understanding of the on-site pharmacist's purpose at this facility								
I understand how the on-site pharmacist's role affect my work								
I can see the potential beneficial impact of having the on-site pharmacist at this facility								
I believe that working with the on-site pharmacist is a legitimate part of my role								

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strong disagree	Not relevant to my role	Not relevant at this stage	Not applicable
I can easily integrate working with the on-site pharmacist into my work								
The on-site pharmacist disrupts existing relationships								
I have confidence in my colleagues' ability to work with the on-site pharmacist								
Facility management adequately supports the on-site pharmacist								
I am aware of reports about the work undertaken by the on-site pharmacist								
My colleagues and I believe that having the on-site pharmacist working at this facility is worthwhile								

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strong disagree	Not relevant to my role	Not relevant at this stage	Not applicable
Residents believe that having the on-site pharmacist working at this facility is worthwhile								
I am open to working collaboratively with the on-site pharmacist at this facility								
I value the on-site pharmacist's impact at this facility								
I can modify how I work with the on-site pharmacist to improve resident care which relates to medications								

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	Strongly agree	Agree	Neither agree or disagree	Disagree	Strong disagree	Not relevant to my role	Not relevant at this stage	Not applicable
Feedback about the activities undertaken by the on-site pharmacist can be used to improve resident medication care in the future								
There are key people who drive working alongside the on-site pharmacist at this facility and get others involved								
I will continue to support the on-site pharmacist working at this facility								

Q13 What is the first three (3) letters of your favourite colour and the name of the first street you lived in when you went to primary school?
Note: This is to link your answers to the first collaboration survey.

e.g. If your favourite colour is blue and you lived on Northbourne Avenue when you started primary school, then please write the first three letters "blu" and "Nor" in the provided box (bluNor)

Thank you for participating in this survey.

Please return your completed survey via email to racfstudy@canberra.edu.au or in the 'Pharmacists in RACF study survey box' located at your facility.

If you would like to receive a copy of the summary report from this study, please email racfstudy@canberra.edu.au

Appendix 6 – Interview guide for residents or family members

Introduce self. Thank you for participating in this interview. The purpose of this interview is to explore your experience interacting with the on-site pharmacist working in a residential aged care facility. Check that participant is happy to consent to being audio taped. Thank participant for returning consent form and ask if there are any questions before we start?

1. Could you please tell me how long you/your family member have been living at this residential aged care facility?

2. Could you please describe any previous interactions you have had with a pharmacist before the on-site pharmacist started working at this facility?

Prompt questions: What was this interaction about? How did you find this interaction? Did this interaction match up with your expectations? Why/why not?

3. Could you please describe what contact you/your family member have had with the on-site pharmacist?

Prompt questions: What activity or activities did this contact relate to? How often did you/your family member interact with the on-site pharmacist? Did you/your family member actively seek out the on-site pharmacist? Why/why not?

4. How would you describe your/your family member's contact with the on-site pharmacist (prompt from resident/family member survey)?

Prompt questions: Was there anything that influenced how your interaction with the on-site pharmacist developed (e.g. pharmacist characteristics/skills)? How has this experience compared to before there was an on-site pharmacist? Did the on-site pharmacist make a difference to you/your family member? How? Why do you think this? Did you feel that the on-site pharmacist worked as part of the health care team to deliver your medication related care? Were there any changes to your medications after your contact with the on-site pharmacist? Do you feel that these changes reflected your preferences? What worked well? What could have been improved?

5. When it comes to medicines, what role do you feel residents/family members should have?

Prompt questions: Did the on-site pharmacist support you/your family member to make decisions about medication issues? How? Was this important to you? Why/why not? What types of decisions do you feel that residents/family member should be involved in? What considerations are required?

6. Do you think there is a need for on-site pharmacists in residential aged care homes?

7. Is there anything else you would like to share with me about your/your family member's experience with the on-site pharmacist?

I would now like to ask you some demographic questions. Are you ok with me asking them?

Q1 What is your/your family member's age? Q2 What is your/your family member's gender?

Q3 If you are a family member, what is your relationship to the resident?

Appendix 7 – Interview guide for on-site pharmacists

Introduce self. Thank you for participating in this interview. The purpose of this interview is to explore your experience as the on-site pharmacist working in a residential aged care facility. Check that participant is happy to consent to being audio taped. Thank participant for returning consent form and ask if there are any questions before we start?

Role and responsibilities

1. Could you please briefly describe the on-site pharmacist role and responsibilities?

Prompt questions: What is the purpose of the on-site pharmacist role? Did anything help prepare you for the role? How did you find the training and guideline materials provided? [CHN evaluation question] How did you find the online diaries and Microsoft Teams online forum?

From your perspective, who has been invested in having the on-site pharmacist at this facility, and has that evolved over time?

Implementation fidelity

2. Could you please describe the types of activities you undertake in this role?

Prompt questions: Prompt from activity list. Did you complete some activities more than others? If so, why? Are there any activities which were more difficult to complete than others? If so, why? Were there any activities you undertook not mentioned in the activity list? What were these activities and what was their outcome? Has this changed over time? What prompted this change? What has been the impact of this change?

How did you assist with medication management during COVID-19? Did the need for all aged care staff to have an influenza vaccine before 1 May 2020 impact the activities you undertook? Did this evolve over time? What changed and why?

On-site pharmacist experience

3. Could you tell me a little bit about your experience of being an on-site pharmacist at a RACF?

- What was easy about being the on-site pharmacist at the facility?

Prompt questions: Could you describe any benefits that you experienced (personal/professional/facility/organisational level)? What were they? What worked and why? Why do you think this? Did this evolve over time?

- What was difficult about being the on-site pharmacist at the facility?

Prompt questions: Was there anything about the on-site pharmacist role that was difficult to implement? In what ways? Did this evolve over time? Could you describe any other challenges that you experienced (personal/professional/facility/organisational level)? What were they? What did not work and why? Did this evolve over time? Were there any difficulties that could be not addressed? Why/why not?

- What are the disadvantages and advantages of being the on-site pharmacist at the facility?

Prompt questions: What parts of the role did you enjoy the most? What parts of the role did you enjoy the least? Were there any disadvantages to having the on-site pharmacist in the facility? Were there any benefits to having the on-site pharmacist? Do you think that the facility might to continue funding this role? Why/why not? If you continued working at the facility, are any changes required e.g. at the facility level and/or on-site pharmacist working hours, role or responsibilities, activities undertaken? Is it sustainable to have integrated pharmacists at RACFs?

Collaboration – RACF care team member, prescribers, others

4. Could you please tell me about your relationship with a RACF care team member?

Prompt questions: Was there anything that influenced how your relationship with this RACF care team member was established (e.g. characteristics/skills)? How did other health care team members work with you? Can you give examples? Did this relationship change over time? Why/why not? How did you come to an agreement with this RACF care team member about your role and responsibilities in relation to resident medications? What happened if there was a disagreement? Was there anything that influenced how your relationship with this RACF care team member was maintained?

What impact did this relationship have on the RACF care team member's work load?

Was your experience of developing a relationship with other RACF team members similar/different? In what ways? Have you become more confident communicating with RACF care team member over time? Why/why not?

5. Could you please tell me about your relationship with a prescriber?

Prompt questions: Was there anything that influenced how your relationship with this prescriber was established (e.g. characteristics/skills)? Was there anything that influenced how your relationship with this prescriber has been maintained?

Can you tell me about how receptive prescribers have been to act upon your advice? Have there been any times when your recommendations or suggestions to health care team members (such as General Practitioners) have not been accepted? Can you give examples? Why do think this was?

What impact did this relationship have on the prescriber's work load?

Was your experience of developing a relationship with other prescribers similar/different? In what ways? Have you become more confident communicating with prescribers over time? Why/why not?

6. Could you please tell me a little bit about how you interact with other health care team members?

Prompt questions: Which health care members do you interact with? What does this involve? How does this communication occur? What has worked? What was not worked? What could be improved? Specific examples?

Noting the survey responses from your colleagues [specify – positive, managed, decreased where applicable], could you please describe whether this was broadly reflected in your interactions?

Overall, could you please describe what factors you have found influenced establishing a working relationship with health care team members? Are these factors similar/different to what is required to maintain these working relationships? Has it been easier to develop relationships with some professionals compared with others? Why do you think this is?

Support and impact

7. What support have you received from the RACF so that you could contribute at the facility? [CHN evaluation question]

Prompt questions: How were you introduced to the rest of the RACF care team? What did this entail? What worked? What did not work? Could you describe any factors that helped or prevented you from contributing at the facility? Did this evolve over time? What changed and why?

Were you introduced to all staff within the first month of commencement? How was medication management issues communicated between yourself and RACF management? Did this evolve over time? Which clinical meetings did you attend? [Medication Advisory, Falls, Incidents, Quality & Safety, clinical governance, clinical handover, case conferences] Why these and not others? Did this evolve over time? Why these and not others? Did this evolve over time? Did you feel supported by the RACF care team? Why/why not? How did RACF management engage with you? How were you supervised as part of the RACF care team?

8. Could you tell me about any changes that have occurred at the facility since you commenced?

Prompt questions: What has been the impact on resident care? Has it changed how health care team members interact with residents? Have there been any changes in resident and family member involvement in decision-making on medication issues? How did you contribute to these changes? Have there been other changes to how resident care is provided? Why/why not?

Have there been any changes to the number of potentially inappropriate medications and quality use of medicines for residents? How did you contribute to these changes? Have there been any changes to RACFs policies and procedures for medication management? How did you contribute to these changes? Have there been any changes to GRACE/ambulance calls, Emergency Department visits and hospitalisations? How did you contribute to these changes?

Have there been any changes to transition of care management? [medication changes, post-discharge, new residents] How did you contribute to these changes?

Have there been any changes to medication administration for new/existing staff? How did you contribute to these changes? Have there been any changes to medication administration rounds? [dose form modification, streamlining processes] How did you pharmacist contribute to these changes?

Have there been any changes to quality improvement activities at the facility? How did you contribute to these changes? [CHN evaluation question]

Do you believe that your role at the facility has added value compared with usual care provided by visiting pharmacists? Why/why not? Did this evolve over time?

Final section

9. For the final section of the interview, I would now like to ask you about:

- What works well?
- What does not work well?
- What could be improved?

10. Is there anything else you would like to share with me about your experience as an on-site pharmacist?

I would now like to ask you some demographic questions. Are you ok with me asking them? Q1 What is your age? Q2 What is your gender? Q3 How many years of experience do you have working with residential aged care and in what capacity? (e.g. community pharmacy supplier, conducting Quality Use of Medicines) Q4 How many years of experience do you have conducting Residential Medication Management Reviews (RMMR)? Q5 Approximately how many RMMRs have you completed over the last 12 months? Q6 How many years have you been registered as a pharmacist? Q7 What qualifications do you hold?

Appendix 8 – Interview guide for RACF care team e.g. managers, nursing staff

Introduce self. Thank you for participating in this interview. The purpose of this interview is to explore your experience interacting with the on-site pharmacist working in a residential aged care facility. Check that participant is happy to consent to being audio taped. Thank participant for returning consent form and ask if there are any questions before we start?

Role and responsibilities

1. Could you please briefly describe your current role and responsibilities?

2. From your perspective, what is the purpose of the on-site pharmacist?

Prompt questions: How would you describe the on-site pharmacist's role and responsibilities? From your perspective, who has been invested in having the on-site pharmacist at this facility, and has that evolved over time? How does having an on-site pharmacist compare to not having one? What type of activities does the on-site pharmacist undertake?

Implementation fidelity

3. Could you please describe the types of activities the on-site pharmacist undertook?

Prompt questions: Prompt from activity list. Did you participate in these activities with the on-site pharmacist? Why these activities and not others? Did the on-pharmacist undertake any other activities (prompt from activity list)? Why/why not? What changed and why? Were there any activities the on-site pharmacist undertook not mentioned in the activity list? Did this evolve over time? What prompted this change? What has been the impact of this change? How did the on-site pharmacist assist with COVID-19 related activities?

Did the need for all aged care staff to have an influenza vaccine before 1 May 2020 impact the activities undertaken by the on-site pharmacist? Did this evolve over time? What changed and why?

Collaboration

4. Could you please describe your relationship with the on-site pharmacist?

Prompt questions: What is your level of involvement with the on-site pharmacist? Did this evolve over time?

Was there anything that influenced how your relationship with the on-site pharmacist developed? Did this relationship change over time? Why/why not? How did you come to an agreement with the on-site pharmacist about your role and responsibilities in relation to resident medications? What happened if there was a disagreement? Have you contacted the on-site pharmacist after hours for any urgent medication management issues? How often? Why/why not?

How did the RACF care team engage with the on-site pharmacist? How did RACF management engage with the on-site pharmacist? How did residents and family members interact with the on-site pharmacist? How did other health care team members work with the on-site pharmacist? Can you give examples? What impact has the on-site pharmacist had on existing working relationships? What impact has the on-site pharmacist had on resident and health care team relationships?

To what extent is the on-site pharmacist part of the health care team? Why/why not? Did this evolve over time? What changed and why?

What has been the impact of the on-site pharmacist on your work load? Has this been similar/different for other RACF staff? Why/why not?

Can you tell me if having an onsite pharmacist has added value to the team? Can you explain more?

Noting the survey responses from your colleagues [specify – positive, managed, decreased where applicable], could you please describe whether this was broadly reflected in your interactions with the on-site pharmacist?

Overall, could you please describe what factors you have found which influenced establishing a working relationship with the on-site pharmacist? Are these factors similar/different to what is required to maintain this working relationship?

When considering the on-site pharmacist, what impact has this role had on your work?

Do you feel that the on-site pharmacist is part of the RACF health care team? Why/why not?

How would you describe your commitment to working with the on-site pharmacist?

Support and impact

5. What supports were put in place so that the on-site pharmacist could contribute at the facility? [CHN evaluation question]

Prompt questions: Could you please describe how the on-site pharmacist was introduced to the RACF care team? What did this entail? What worked? What did not work? Could you describe any factors that helped or prevented the on-site pharmacist from contributing at the facility? Did this evolve over time? What changed and why?

Was the pharmacist introduced to all staff within the first month of commencement? How was medication management issues communicated between the on-site pharmacist and RACF management? Did this evolve over time?

Which clinical meetings did the on-site pharmacist attend? [Medication Advisory, Falls, Incidents, Quality & Safety, clinical governance, clinical handover, case conferences] Why these and not others? Did this evolve over time? How was the on-site pharmacist supervised? What worked? What did not work? Could you describe any factors that helped or prevented the on-site pharmacist from contributing at the facility (or becoming part of the health care team)? Did this evolve over time? Why/why not?

Was there anything that was difficult to implement so that the on-site pharmacist could work at your facility? In what ways?

6. Could you tell me about any changes that have occurred at the facility since the on-site pharmacist commenced?

Prompt questions: What impact has the on-site pharmacist had on resident care? Have there been any changes in resident and family member involvement in decision-making on medication issues? How did the on-site pharmacist contribute to these changes? Have there been other changes to how resident care is provided? Why/why not? Has it changed your interactions with residents? Has it impacted your interactions with other health care team members?

Have there been any changes to the number of potentially inappropriate medications and quality use of medicines for residents? How did the on-site pharmacist contribute to these changes? Have there been any changes to RACFs policies and procedures for medication management? How did the on-site pharmacist contribute to these changes? Have there been any changes to GRACE/ambulance calls, Emergency Department visits and hospitalisations? How did the on-site pharmacist contribute to these changes?

Have there been any changes to transition of care management? [medication changes, post-discharge, new residents] How did the on-site pharmacist contribute to these changes?

Have there been any changes to medication administration for new/existing staff? How did the on-site pharmacist contribute to these changes? Have there been any changes to medication administration rounds? [dose form modification, streamlining processes] How did the on-site pharmacist contribute to these changes?

Have there been any changes to quality improvement activities at the facility? How did the-onsite pharmacist contribute to these changes? [CHN evaluation question]

Have there been any changes due to on-site pharmacist provided training? Have there been any changes to the care provided by RACF care team members due to the NPS Medicines Wise training? What has changed? Why/why not?

Have you, or any other RACF staff accessed other available pharmacist services during COVID-19 e.g. Aged Care Pharmacy Advice line?

Has having the on-site pharmacist at the facility been beneficial compared with usual care (community pharmacy, QUM and RMMR services)? Why/why not? Did this evolve over time?

Final section

7. For the final section of the interview, I would now like to ask you about:

- What works well?
- What does not work well?
- What could be improved?

Prompt questions: Could you describe any other challenges that you experienced (personal/professional/facility/organisational level)? What were they? Were there any difficulties that could be not addressed? Why/why not?

It is easy to work with the on-site pharmacist as part of your normal work? Could you describe any benefits that you experienced (personal/professional/facility/organisational level)? What were they?

Do you think that the facility might to continue funding this role? Why/why not? If the on-site pharmacist continued working at the facility, are any changes required e.g. at the facility level and/or on-site pharmacist working hours, role or responsibilities, activities undertaken?

8. What are your thoughts on having on-site pharmacists at other facilities? [CHN evaluation question]

Prompt question: If pharmacists worked at other facilities, what funding approach might work? Is it sustainable to have integrated pharmacists at RACFs?

9. Is there anything else you would like to share with me about your experience working with the on-site pharmacist?

I would now like to ask you some demographic questions. Are you ok with me asking them?

Q1 What is your age? Q2 What is your gender?

Q3 How many years have you worked in this facility?

Q4 How many years of experience do you have working in residential aged care in any role?

Q5 How many years of experience do you have in your profession?

Q6 What qualifications do you hold?

Appendix 9 – Interview guide for prescribers e.g. GPs

Introduce self. Thank you for participating in this interview. The purpose of this interview is to explore your experience interacting with the on-site pharmacist working in a residential aged care facility. Check that participant is happy to consent to being audio taped. Thank participant for returning consent form and ask if there are any questions before we start?

Roles and responsibilities

1. Could you please tell me a little bit about your role providing care to residents at this facility?

2. From your perspective, what is the purpose of the on-site pharmacist role?

Prompt questions: How would you describe the on-site pharmacist's role and responsibilities? From your perspective, who has been invested in having the on-site pharmacist at this facility, and has that evolved over time? How does having an on-site pharmacist compare to not having one? What type of activities does the on-site pharmacist undertake?

Collaboration

3. Could you please tell me about your relationship with the on-site pharmacist?

Prompt questions: What is your level of involvement with the on-site pharmacist? What activities have you undertaken with the on-site pharmacist? Did this evolve over time?

Was there anything that influenced how your relationship with the on-site pharmacist developed? Did this relationship change over time? Why/why not? How did you come to an agreement with the on-site pharmacist about their role and responsibilities in relation to resident medications? What happened if there was a disagreement?

Could you please describe your process for assessing and responding on on-site pharmacist recommendations e.g. relating to medication reviews? How is this similar/different to how you assess and respond to RMMR pharmacist recommendations?

What impact has the on-site pharmacist had on existing working relationships? Has it changed your interactions with other health care team members? Has it changed your interactions with residents? Could you provide an example of this?

To what extent is the on-site pharmacist part of the health care team? Why/why not? Did this evolve over time? What changed and why?

What has been the impact of the on-site pharmacist on your work load? Has this been similar/different for other prescribers? Why/why not?

Overall, could you please describe what factors you have found which influenced establishing a working relationship with the on-site pharmacist? Are these factors similar/different to what is required to maintain this working relationship?

When considering the on-site pharmacist, what impact has this role had on your work?

Do you feel that the on-site pharmacist is part of the RACF health care team? Why/why not?

How would you describe your commitment to working with the on-site pharmacist?